Scientific American.

A JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, AGRICULTURE, CHEMISTRY, AND MANUFACTURES.

VOL. II.—NO. 4. NEW YORK, JANUARY 21, 1860. NEW SERIES.

THE PROCESS OF BEER-MAKING—MECHANICAL, CHEMICAL AND MICROSCOPIC.

We presume that the invention which we here illustrate will rank among the great inventions of the decade; it is certainly one of the most ingenious. It is an apparatus for cooling beer in the process of brewing, and in order to render its advantages intelligible to our readers, it will be necessary to give a brief account of this process.

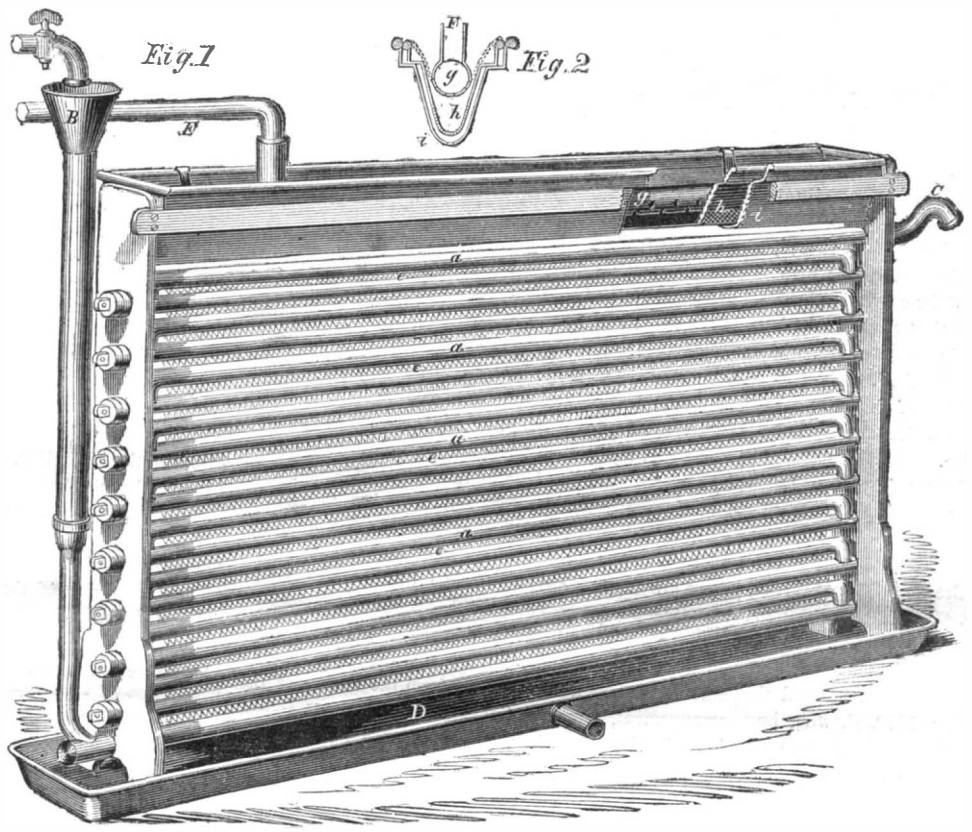
Beer is made of water, barley and hops, and the principal change which is effected in the process of brewing is the conversion of the starch and gluten in the barley into sugar and alcohol. Starch, sugar and alcohol are each composed of carbon, hydrogen and oxygen, combined in slightly different proportions, and the brewer, by the mysterious forces of vegetable life and heat, varies these proportions so as to change the starch into sugar and alcohol.

The first step in the process is to sprout the barley, and convert it into malt. To do this the grain is first steeped in cold water from 40 to 60 hours, which produces the same effect upon it that the moisture of the earth does upon seed planted in the ground, causing it to swell and preparing it to vegetate. The barley is next spread on a floor of stone flags, in square heaps, from 12 to 16 inches high, where, in about 24 hours, it begins to sprout; the radicle, or part that forms the root, first appearing at the tip of each grain, and about a day afterwards the plumula (the part that would grow upward in the air) coming forth from the same end of the seed, and pushing along towards the other end in the form of a leaflet. It requires about a fortnight for the plumula to grow the length of the grain, and as it creeps along, that portion of the seed which is opposite to it experiences the mysterious change in its nature which is produced by the process of malting, the conversion of starch into saccharine matter. When the germination has reached the proper stage, that is when the plumula has reached the end of the grain opposite to that from which it sprung, the malt is dried in a kiln and crushed between cylinders.

The second step in the process of brewing is *mashing*, which consists in steeping the malt in hot water, at a temperature of from 145° to 200°. This dissolves the saccharine matter already formed and converts most of the remaining starch into sugar. The liquor is now called *wort*. It takes about two bushels of malt to make a barrel of ordinary beer.

The third step is *boiling in the hops*. The wort is pumped up into a large copper kettle, and, the hops being mixed with it, is boiled some 5 or 6 hours. The quantity of hops required to the bushel of malt varies from ¼ of a pound to a pound, according to the strength of the beer.

After boiling, the wort is to be *cooled*; and the usual method of doing this is to pump it up into a shallow tank occupying almost the whole of the upper story of the building, where it rests in a stratum about two inches thick, and is exposed to free currents of air passing through windows open on every side of the building. In some establishments the cooling process is completed in the tank, while in others the wort is partially cooled in the tank, and is then passed to some of the numerous refrigerators which have been invented for that purpose.



BAUDELOT'S BEER-COOLING APPARATUS.

When the wort is reduced to a temperature of from 55° to 65°, it is run into the "gyle tun," and mixed with yeast to ferment; in general, one gallon of yeast being sufficient for 100 gallons of wort. The process of fermentation is one of the most interesting of the operations of nature, and its investigation has occupied the attention of several of the foremost intellects of the world.

There are several chemical changes operating to clarify the beer, &c.; but the principal one is, as we have stated, the conversion of sugar into alcohol. But these chemical changes are caused, or at least accompanied, by the growth of a vegetable, so small as to be wholly invisible to the naked eye, and which is peculiarly interesting as presenting the very lowest form of vegetable organization, being a simple cell. Fig. 3 is an engraving of this vegetable, from a drawing by Edwards, made expressly for this article, from specimens of yeast obtained at Miles' brewery, in Christie-street. The separate cells are entirely invisible to the naked eye, being magnified in the cut 760 diameters. As the yeast had been several days in fermentation, the plant is shown in the successive stages of its growth; *a a* being the simple cell in its earliest stage, formed of an enveloping membrane of inconceivable fineness, enclosing a semi-fluid mass filled with very small seeds. When yeast is put into a fermentable liquid, like wort, these cells begin to grow in a very peculiar manner; some of the seeds begin to swell and push out buds on one side of the cell, as seen at *b*; and, this development continuing, assumes the appearance of *c*. Meanwhile, another seed, swelling, pushes out a bud on the opposite side of the cell, and both continue to grow till they become of the size of the parent cell, when they bud in turn; and thus form chains, as seen at *d*. From the state shown at *d*, two forms of development take place; a portion of the cells burst, and scatter the seeds into the surrounding liquid, as at *e*; while another portion branch forth, as at *e'*. The yeast plant has been patiently watched by Hassall through the further stages of its growth; but as that represented at *e'* is quite as far as it is allowed to go in the process of brewing, we shall not trace it farther in this connection. It has been named the *Torula cerevisiæ*. It will be understood that the increase in the quantity of yeast by fermentation is owing to the growth of this plant. The process of fermentation occupies several days; the time varying with the temperature, which ranges from 70° to 90°, and after this process is completed, the beer is stored away in the cellar to ripen with age.

It is from its influence on the fermentation that the mode of cooling derives its great importance. How this influence is exerted is yet largely enveloped in mystery, but practice has taught that the wort should be exposed freely to contact with the air, that the cooling should be

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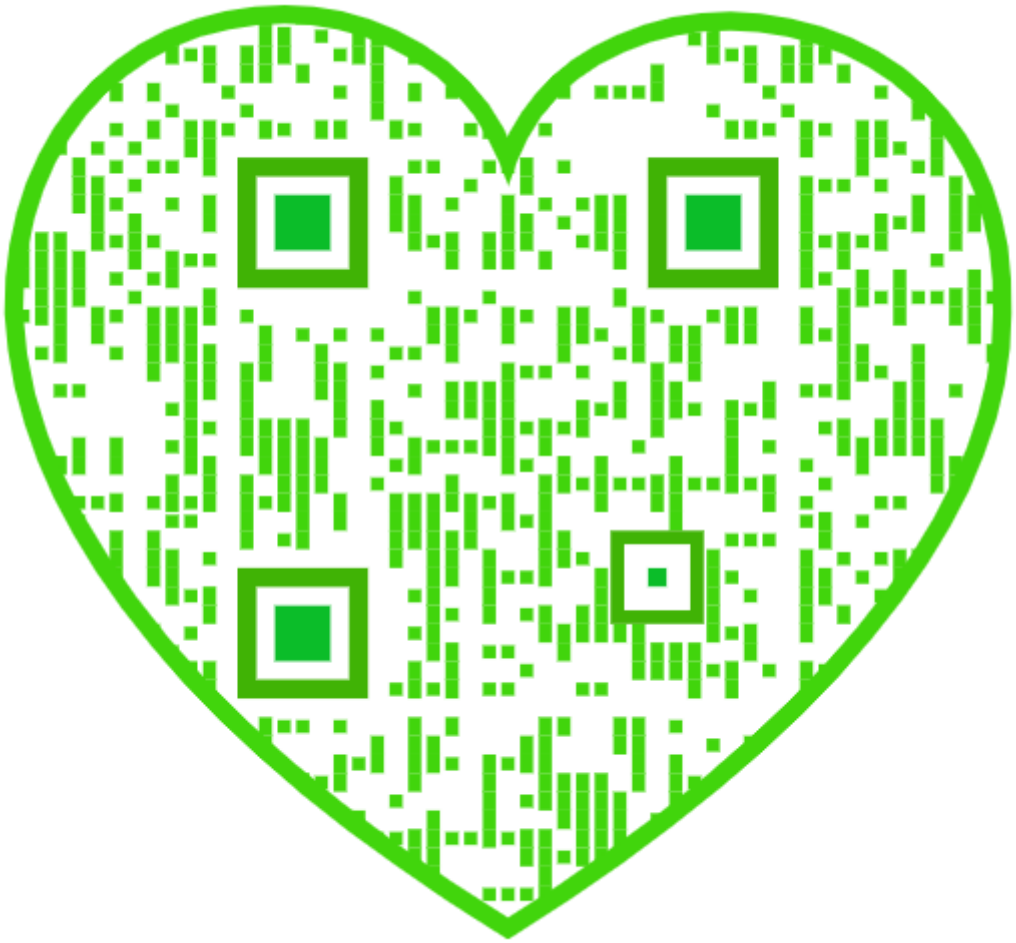

as rapid as possible, and that the wort should not be subjected to any sudden shock by bringing it at a high temperature in contact with a very cold surface. It will be seen how ingeniously, beautifully and perfectly these *desiderata* are obtained by the apparatus represented in the accompanying cuts.

It consists of a series of horizontal copper pipes, *a a a*, say 22 in number, and 2¼ inches in diameter, communicating at their ends so that a stream of water may flow constantly through them. The water is introduced through the vertical pipe, B, and discharged at C; the rapidity of the flow being, of course, adjusted to the hight of the head. The wort is allowed to trickle in fine streams upon the upper side of the highest pipe, which it passes around in an extremely thin sheet, and falls upon the pipe below, passing around that in the same manner; and so on, till it drops from off the lower pipe into the trough, D. Thin sheets of metal, *e e e e*, serrated at the lower edge, are fastened longitudinally to the lower side of each pipe to conduct the liquor in minute streams from one pipe to the other. As the cold water enters the bottom of the series of pipes, and the hot wort is applied to the top of the series, any sudden shock in the process of cooling is avoided; the wort, as it decends, finding each pipe raised to a temperature approximating to its own, and the water, as it rises, absorbing the heat from liquor of a constantly-increasing temperature, until it is discharged almost as hot as the wort when it enters the apparatus. Thus nearly all the heat is transferred very rapidly from the wort to the cooling water.

The liquor is brought to the cooler through the pipe, F, and enters first the horizontal cylinder, *g*, which is perforated with holes to strain it of its coarse impurities. From the cylinder, *g*, it falls into the trough, *h*, the bottom of which is made of very fine wire gauze, which strains the liquor into the lower trough, *i*. This lower trough is perforated along the middle of the bottom by a single row of small holes, through which the wort falls upon the surface of the upper pipe.

This ingenious apparatus was invented by Jean Louis Baudelot, of Harancourt, France, and it comes to this country with numerous recommendations from French *savans* and practical brewers. A cooler has been constructed and tried at the Croton Brewery of W. B. Miles, No. 59 Christie-street, this city. Mr. Miles states that, in the experiment, it cooled 30 barrels in about an hour and a half; that the wort was let on at a temperature of 178°, and came off at 55°; that the water entered the pipe at 40°, and was discharged at 144°, showing how nearly all the heat was transferred from the wort to the water. The quantity of water used was about the same as that of the wort. It is proposed, in using this cooler, to dispense entirely with the large tank at present employed, and to take the liquor directly from the boiler.

The American patent for this invention was issued to Henry Migeon, on November 1, 1859; and persons desiring further information in relation to it will please address Geo. B. Turrell, 626 Washington-street, this city.

OUR CORRESPONDENCE.

THE NATIONAL CAPITOL—WARMING AND VENTILATION—SLEEPING CARS—CITY RAILROADS, ETC.

CINCINNATI, January 7, 1860.

MESSRS. EDITORS:—As this is my first "breathing-place," I take the opportunity to drop you a few lines. I left Richmond, Va., for Kansas Territory on the 2d day of the new year, by way of Washington; and having a few hours to spare in that city, took occasion to visit what some irreverent wag has termed the national *gas* factory, *i. e.*, the capitol. An esteemed friend connected with the "extension" acted as my guide on the occasion, and I am constrained to believe that to his talent is in some part due the perfection of detail which everywhere meets the eye.

Any attempt at general description being quite out of place, I will merely remark that the warming and ventilating arrangements alone are well worthy of a visit; and as it was to them that my attention was mostly directed, they shall receive the first mention, and that a very cursory one. The fresh air is driven in by two large fans, one for each side of the building, between a great number of steam pipes, supplied from several tubular boilers in the basement. From these pipes the incoming draft derives its heat, the amount of which can be regulated, according to circumstances, by throwing out of connection with the boilers one or more sets of pipes. There is an abundant supply of thermometers to indicate the varying temperatures, but I did not notice a single hygrometer to tell its tale, and some are badly needed. The fresh warmed air is conducted to various apartments, principally to the Senate Chamber and House of Representatives, by appropriate passages and conduits; into the rooms it is generally admitted through the floor by handsome registers (in the Senate and also in the House, I believe). Each senator has one in front of his chair, so that he can warm his feet at will—a good arrangement to keep the blood from their heads, but it does not always seem to have this happy effect. The air having fulfilled its double object of supplying warmth and pure breathing material, is conducted away through various apertures in the ceiling. There does not appear to be any special sucking apparatus to help the foul gases to escape (excepting the heat of the gaslights overhead, and these are intended to give light as their primary and perhaps sole object, and therefore are not arranged with much design towards that end); dependence being placed on the driving power of the fans.

It is astonishing how little steam heat is required to keep the temperature of the two legislative halls abundantly high, when many people are in them. The lowest temperature, the morning in question, was 2½° above zero, and at the time of my visit it was still very cold out of doors, yet the heating apparatus was by no means worked up to its capacity. The whole affair is very ingeniously contrived, and reflects credit in many points on its constructors. Yet I cannot give it unqualified approval; I allude more to the system than the actual details. 1st, The air is *too dry*—that almost universal fault to be found, when the attempt is made to warm the room by the admitted pure air. My friend stated that when the incoming current was dampened by steam jets, the moisture was condensed on the windows, &c., of the halls, and therefore they abandoned it. Well, suppose it was, what matter? Better to have it so, than injure the lungs of the people who, as it now is, are condemned to breathe that unnatural air. 2d, The foul air escapes are not arranged in the best manner, the whole of this part of the matter is not as well done as it might be, especially in the committee rooms; indeed, there are several apartments and passages *without* any foul air escapes—an omission I was quite unprepared to find. 3d, The galleries for the spectators are badly supplied with pure air. There should be an abundant amount furnished for them, as, from the nature of their arrangement, they are liable to be somewhat infected from the chamber below. I got a severe headache there in a short time, at all events.

The building is, with great judgment, made fire-proof. It is better to expend a few thousand dollars more on any public edifice than leave it at the mercy of a spark or a friction match, and so lose immense wealth that often cannot be gathered again. It is almost incredible that we, who, as a nation, annually lose more from conflagration than any other people on the globe, should persist in putting up such inflammable structures as we do, year after year. Possibly it may be from the notion that iron is such a "very combustible substance" (lately expressed opinion of certain architects!) that people are afraid to employ it more extensively in their houses. Or can it be that the more buildings are burned the more others are built, and the more work for the builder?

Of the beauty and magnificence of the capitol I have nothing to say. Descriptions of decoration are out of my line; it will amply repay a visit, however; if for nothing more than to let the universal Yankee nation see how some of its money goes. "More regal than republican," will be the verdict of many, doubtless, after gazing on its splendors. It is a bare question, whether it is absolutely necessary for good legislation that the senators should have baths hewn out of *solid marble*, like the sarcophagi of the Egyptian kings, or whether all this gilding and bronzing and statuary are essential to the safety of the country. Is it to help to pay for this that it has lately been decided that blank books, letter paper, &c., are to be charged *letter postage*, while hundreds of tuns of useless matter goes through the mails scot free? But let it pass! we must "grin and pay," I suppose.

As King Frost ruled supreme over the Potomac, the boat had to acknowledge his supremacy by keeping holiday. It does not speak much for the enterprise of the people that there is no direct line from Washington to Richmond; as it is, we had to go round by Gordonsvillle. If the individuals in charge of the baggage would look a little better after their business it would be also well; the arrangements for checking through from Richmond to Washington are not good.

On the Baltimore and Ohio Railroad they had a good sleeping (berth) car attached to the night train to Wheeling. This should be a permanent institution on all lines, and doubtless will be after a time. If there was some way of *eating* leisurely in the cars while proceeding on a journey, as well as sleeping, it would be a vast improvement over the present method of producing dyspepsia, at 50 cents a head, though no doubt a loss to the obliging gentlemen who keep the so-called "eating (*cheating?*) houses" along the various railroads. In addition to the regular sleeping car on this line, there were cars with good comfortable sleeping *seats*, on which persons can enjoy very tolerable rest without the extra charge which must be paid for admission into the sleeping car. I wish as much could be said for the warming and ventilation of the cars as for the resting accommodations; but really one stove is not enough to keep a car warm in such severe weather as the present, and as for the breathing "fixings," they were "few and far between." Fortunately, there was not a great crowd, and the carbonic acid gas was not generated in very alarming quantities.

Though there was some snow we were "up to time" at the Ohio river, and the track also seemed in fair order, considering the bad weather, as far as could be judged by the motion of the cars over it.

About 15 hours from Washington suffices to reach Cincinnati over the Central Ohio and the Little Miami railroads. The further to the West we went, the rougher the tracks seemed to become.

The city railroads of Cincinnati appear to be a success, and a great boon there, as in all cities where they are introduced. The profile of the track is not good; at least, in some places, there are very unnecessary undulations of the grade line, which will be severely felt if they ever make use of steam instead of horse power, as I trust will be done sooner or later, not only there, but in all other localities where city railroads exist. It is hard to overcome prejudice and ignorance in such matters. May it be the mission of the SCIENTIFIC AMERICAN to contribute in no inconsiderable degree to this result. You are right—we must have steam on the city railroads before we run the steam carriage on common (unrailed) streets; and we must have steam carriages and steam wagons for a long time in daily use in our large cities before they can be used profitably on our suburban roads. The location and construction of these are both so atrocious that one is almost driven to despair of ever hearing the steam whistle on them. England is better adapted to common road engines than this country, and will take the lead in this matter. We ought to show the way in steam plowing, but we have not as yet done so.

A substitute for wood engraving is in use at the Phonographic Institute of Cincinnati, which promises much to illustrated papers, &c. It gives a more accurate outline at about one-half the cost of wood-cutting. It is an application of electrotyping, and consists in coating ground plate glass with a composition resembling wax; on this the engraving is traced *down* to the ground glass plate; it is then electrotyped, and when "backed up" with type metal, is ready for the printer. This method has been used by Mr. Pitman, in the production of phonographic outlines, for the past four years, but the details have only lately been perfected.

E. M. RICHARDS.

PATENT EXTENSION CASES.

Screw Machine.— Solomon Merrick (deceased) of Springfield, Mass., obtained a patent on March 7, 1846, for an improved feeder for screw machines. A. D. Briggs, administrator, has applied for its extension for seven years. The case is to be heard on the 6th of March, at the Patent Office. The testimony closes on the 23d of February; opposition testimony must be sent in writing.

Register for Stoves.—Washburn Race, of Seneca Falls, N. Y, has applied for the extension of a patent granted to him on April 4, 1846, for an improved stove register. The case is to be heard at the Patent Office on the 19th of March next, and the testimony closes on the 5th of the same month.

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THE WINANS STEAMSHIP.

MESSRS. EDITORS:—On page 412, Vol. I. (new series), SCIENTIFIC AMERICAN, you published some extracts from the letter of the Norfolk correspondent of the New York *Herald*, in regard to the trial trip of this vessel upon the ocean The following statement may not be uninteresting:—

When the Messrs. Winans planned their ship, improvement seemed to have very nearly reached perfection in adapting to the use of steam those forms of nautical construction originally contrived for sails and oars. For inland navigation generally, the American river and lake steamers—for the commercial marine, the Collins and Cunard lines—and for war, the steam navies of France and England—had apparently accomplished everything in these directions, and upon this model, of which science and ingenuity were capable. Yet, while the time of transit was greatly accelerated; little has been done, comparatively, towards the *desiderata* of safety, economy and uniformity in the transportation of persons or property. Steamers still went down at sea, were destroyed by fire, or were cast upon the shore; and the length of their passages was still dependent, though in a much less degree, upon the same contingencies of the seasons that had impeded sailing vessels. As to economy, every new ship on all the leading lines was made more expensive than the last. Government subsidies became necessary to their existence. Without (at least) mail contracts, they ceased to be remunerative. If any great improvement was to be looked for, then, in these particulars, it was clear that it must be in a new direction; so, striking out accordingly, the Messrs. Winans adopted the form with which the public have since become familiar, especially through the illustrated press. Building their vessel wholly of iron, of a shape approaching a parabolic spindle, they obtained the greatest strength, with the least dead weight, from a given quantity of material, combined with the greatest economy of construction. Placing their propeller in the center, transversely to the axis of the steamer (its hub, so to speak, being a drum of the same diameter as the latter), they were enabled to exert a greater and more uniform power in proportion to tunnage than had ever been employed before, and that was limited only by the character of the blades and the capacity of the engines. The plan of construction thus adopted, besides its original economy, would, it was believed, be attended also with economy in service; there being less dead weight to be driven through the water, with a smaller cross section, better lines, and less of that resistance which is occasioned by the hull and "top hamper" of ordinary seagoing propellers. While great speed might thus be anticipated, it was also supposed that it would be comparatively uniform—that, offering less resistance to the waves, the vessel would be less affected by them—that, instead of mounting and descending them, she would *pierce* them; and thus, having no occasion, even in the roughest weather, to "slow" her engines, her winter voyages across the Atlantic would be but little, if any, longer than her summer ones Looking to safety, it was evident that, being built altogether of iron, and having no woodwork in the shape of decks and interior joinery that might burn, such a vessel could be made altogether fire-proof; while the facility with which water-tight compartments, in any number, might be introduced, would lessen the risk of loss of life from collision, or even wreck, to a greater extent than had ever been accomplished. It was hoped, too, that the steadiness of the vessel, when at sea, in heavy weather, would go far to obviate one of the most disagreeable accompaniments of a voyage—sea sickness.

With the above-mentioned views, the Winans steamship was commenced; and on January 7, 1859, steam was first applied to the propeller. Since then she has been made the subject of constant and carefully registered experiments. On her first trial it became evident, from the wave at her bow and the furrow at her stern, that she was too blunt—that there had been an error in lessening the radius of the section of the spindle as it approached the extremities; the wave being where the change of curvature occurred. New ends were therefore constructed in lieu of the first, so as to give a uniform curve. The wave was now greatly diminished, and there was a large increase of speed. The ends were then further lengthened. This time there was no increase of speed, but the wave disappeared absolutely, and the vessel entered and left the water with scarcely a ripple even. The limit of improvement in this direction had evidently been reached. The true form of least resistance lay somewhere between the second and third lengthening of the vessel. The pitch, number and shape of the blades of the propeller became also the subject of experiment. Change after change was made with improved results. As the pitch became coarser, the economical effect was very strikingly improved. Further experiments in this regard are still in progress, and will be continued until, improvement apparently ceasing, the desired information shall have been obtained in this particular. The proper shape of the vessel and the best arrangement of the propeller, in its details, were naturally the most important considerations, and the experiments in regard to them have been most carefully made; the speed being measured by the buoys in the ship channel of the Patapsco and Chesapeake Bay, the distances between which were furnished to the Messrs. Winans by Professor Bache, the distinguished superintendent of the Coast Survey Office, and the experiments being repeated until no question existed as to the results. Experiments were also made with regard to every other matter which could in any way influence the plan of the larger vessel that the Messrs. Winans propose to build. While these were in progress, the predictions made by the scientific press and by the public, both in this country and abroad, were tested most satisfactorily, and all unfavorable opinions, without a single exception, were ascertained to be unfounded. Still, the action of the vessel in a heavy sea-way was yet to be ascertained; and hence the trip to Norfolk. Here the anticipations of the builders were fully realized. The varying action of the waves (which operate to produce rolling almost wholly by their friction upon a vessel having the same relation between the centers of gravity and rotation as this one) was apparently powerless to overcome the *vis-inertiæ* of the steamer, even when in the trough of the sea; and when she was moving across it, the advancing or retreating wave, penetrated by the pointed beak below its crest, seemed not to have sufficient power to lift the vessel forward, but, rolling for some distance over it, gave way, as it were, and settled down to the right and to the left, rising some three feet above the sleeve around the propeller, and elevating the steamer bodily upon nearly an even keel in proportion to the hight of the watery mass, without producing any apparent tendency to pitch. During these experiments, two life-boats attached to the chimneys, near their tops, afforded a resistance to the wind; and when the vessel was in the trough of the sea, with the wind "abeam," these boats caused a steady list to leeward, proportionate to the violence of the gale, but never exceeding 10 degrees in the heaviest gusts, and amounting, at other times, to less than five. But for the life-boats, there seemed to be every reason to believe that the list to leeward would never have exceeded that which was due to the pressure of the wind against the ventilator and chimneys. The steamer ran twice out to sea from Norfolk; and it was on the second trip that a gale from the northwest—coming unobstructed down the Chesapeake, and meeting the "ground swell" between Cape Henry and Cape Charles—afforded every opportunity to test the qualities of the steamer as a sea-going vessel. No variation in the movement of her engines was perceptible during the experiment; her speed was apparently the same throughout; she encountered the waves without any sensible concussion or shock; she was steered by one man at the wheel with great facility; and out of the many landsmen on board, not one was sea-sick!

So thoroughly satisfied were the Messrs. Winans with the result of their experiments that they determined to add 200 feet, amidships, to the length of the vessel, to fit it up as a saloon with state-rooms, to multiply the water-tight compartments, and to otherwise prepare her for the purpose—put her at once in passenger service on some established route, in which, of course, she must work her own way into public favor and reputation.

The parties who are equally interested in the experiments that have been made, and who are now engaged in carrying out the system, are Messrs. Ross and Thos. Winans, of Baltimore, and William L. Winans, of St. Petersburg, the result, after the original invention by the first two persons, is owing to joint discussion, in which no one has taken a more active part than the gentleman now in Europe, who has brought to the subject the suggestions of a large experience in all matters of scientific and practical mechanics, and a fund of collateral information only to be obtained abroad.

B.

COAL TAR FOR TREES.

MESSRS. EDITORS:—It is stated, on page 370, Vol. I. (new series), SCIENTIFIC AMERICAN, that you have been assured by those who have tried the experiment, that coal tar is excellent for preventing animals from girdling fruit and other trees. I have a friend who was assured some years ago that it was good to prevent ants from climbing up such trees; this induced him to apply it with a brush to about 30 thrifty apple trees in the month of June. In a few days aftewards he had the mortification of seeing them girdled by it, more mechanically perfect than could have been done by either mice or rabbits! I think it nearly equal to *nitric acid* for trees and vegetables. A. H.

Memphis, Tenn., Jan. 10, 1860.

[The above is important information and deserves further investigation. Why should coal tar act upon the bark of trees to remove it from the trunks in one case and not in another? Is it because it was applied hot in one case and cold in another; or is it owing to the peculiar period of the year when the sap was flowing free in one case and not in another? In the case of the person referred to by our correspondent, he lost 30 good fruit trees by the application of coal tar, which others have used with impunity. More practical information—facts derived from experience—is wanted on this subject.—EDS.

ST. LOUIS FUR TRADE.—This is an important branch of trade with the city of St. Louis, carried on with the western plains. The *Democrat* gives the receipts and the first cost of the furs received in that city last year as follows:—

85,000 buffalo robes, $4 each, average	$340,000 00
125,000 coon skins, 65c. each	81,250 00
37,000 mink skins, $1.60 each	59,200 00
120,000 lbs. deerskins, 22½c. per lb	27,000 00
10,800 wolf skins, 90c. each	9,720 00
34,500 opossum skins, 18c. each	6,210 90
1,100 otter skins, $2.75 each	3,025 90
4,000 fox skins, 30c. each	1,200 00
5,500 muskrat skins, 20c. each	1,100 00
2,050 wild cat skins, 35c. each	717 50
Total	$529,422 50

To which we may add $20,000 for beaver, bear, badger, cross, red and silver fox, fishers, skunk or polecat, panther, martin, and other furs and skins. To this sum of $550,000, may also be added the trade of our dealers in furs bought in Arkansas and other localities, and shipped directly East without being brought to St. Louis. The smaller furs in the above list seek this market from Tennessee, Arkansas, Illinois, Missouri and other territory contiguous. There are also received large numbers of Indian dressed deer skins of considerable value. All the buffalo robes are dressed by Indian squaws, scattered over the great West. The Indian men or "braves" hold work in too great contempt to do anything more than shoot the buffalo; but the poor squaws must dress all those which are marketed. The number of robes is decreasing annually, not so much by the lessening of the immense buffalo herds as by the extinction of the Indian race, or the occupancy of their grounds by the whites. Some years as high as 120,000 robes are brought to St. Louis; usually about 110,000; but last year only 85,000, besides the buffalo calf skins, which are also quite numerous.

THE HORRORS OF BURNING FLUID.—That indefatigable inquirer into all sorts of mysteries, E. Merriam, states that, in the year 1859, he has recorded 83 deaths and the serious injury of 106 persons, all resulting from the use of burning fluids; while the loss of property by fire from the use of those vile compounds amounts to $44,000. The whole number of deaths since July, 1850, he records as 424; injured, 623. We long ago ordered this stuff out of our house, and we advise all our readers to do the same thing. Use coal oil, tallow candles, pine knots, anything rather than hazard life, limb, and property by the constant use of a dangerous burning fluid.

HOW TO PRESERVE LADIES' FURS.—Fine furs should be kept in a cold place. An experienced dealer will tell, the moment he puts his hand on a piece of fur, if it has been lying in a warm, dry atmosphere; it renders the fur harsh, dry and shabby, entirely destroying the rich, smooth softness which it will have if kept in a cold room.

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THE DECIMAL SYSTEM OF WEIGHTS AND MEASURES.

The Secretary of the Treasury, in his recent report, thus speaks of this important matter:—

"On the 21st of January last, I submitted to the House of Representatives, in answer to resolutions of that body, a report in reference to the export and import trade of the United States with Great Britain and France. The investigation which I was required to make for that purpose brought to my attention the various systems adopted by different countries of obtaining and keeping commercial statistics. These systems are so various that I found it impracticable to institute any comparison of the facts exhibited in the tables of the different governments, which could be regarded as accurate and reliable. Every commercial man will pronounce such a state of things an evil of great magnitude, and one which demands a prompt remedy, if it can be found. To avoid a recapitulation of the views presented in that report, and for the purpose of bringing the subject to the attention of the present Congress, I append to this report a copy of that communication, and would ask for it a consideration at this time. I do not know a greater benefit that could be conferred upon the commercial interest of the country, at so small an expense, than the adoption by the leading commercial governments of the world of a uniform system of commercial statistics—a uniform unit and currency, and uniform weights and measures. Upon one branch of the subject, valuable suggestions will be found in the accompanying report of the Director of the Mint. The importance of the subject cannot be over-estimated, and it is hoped that it will receive the careful consideration of Congress at its present session."

For sixty years the civilized nations of the world have been discussing the subject of a common system of weights and measures for all. And all this time one of the largest of these nations has had a perfect decimal system in operation which would, no doubt, have long been adopted by the others, had it not been for the peculiar circumstances of its origin. It was during the intellectual activity of the first French Revolution that the French decimal system of weights and measures was introduced; and with the ardent hopes of that period they anticipated its speedy adoption by the other nations of the earth, for, besides being as perfect as any system that could be devised, its general adoption would secure the immense advantages of common weights and measures throughout the world. But unfortunately it so happened that, for the twenty years succeeding the change in France, the English government, which was then under the absolute control of the nobility and aristocracy, was warring with all its powers against the *ideas* of the French Revolution. The intellect of the nation was enlisted against these ideas, and in the general sweep of prejudice against the enemy, even the admirable system of weights and measures was condemned by the learning and talent of the English people. The prejudice has now abated, but the literature with which it was filled remains, and exerts its influence over the present generation. The several scientific societies in England, at their annual meetings, generally introduce the subject of weights and measures and moderately discuss it in their solid elephantine way, when it is quietly laid on the shelf to slumber for another year Unfortunately our own societies have caught this same habit; and if this great reform is left to them it will never be accomplished.

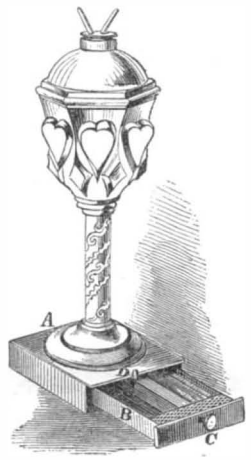
Now, there is an opportunity for some member of Congress to distinguish himself more, and to render a greater service to the country and the world, than he is likely to do in any other way, by practically obtaining this great desideratum, for which the first intellects of the world have been so long working. Let him just introduce and carry through a short bill for the establishment, in this country, of the French system of weights and measures. No better system than this is likely ever to be devised, it has the great advantage of being in use by one of the leading commercial nations of the world; and with the plastic character of our people, the effort of making the change would hardly be felt. In this system the standard of linear measure is the *metre* which is 39.37-100 inches in length. Ten metres make a decametre, 100 a hectometre, 1000 a kilometre, and 10,000 a myriametre; the 1-10th part of the metre is a decimetre, and the 1-100th part is a centimetre. The unit for liquid measure is the *litre*, which is equal to the cubic decimetre. Ten litres make a decalitre, 100 a hectolitre, and so on. The unit of weight is obtained by filling a cubic centimetre with pure water of the temperature of melted ice; this is called the *gramme*. Ten grammes make a decagramme, 100 a hectogramme, and 1,000 a kilogramme. Thus the measures and weights are bound together, and the nomenclature is rendered as simple as possible. To either metre, litre or gramme, the prefix deca means 10 times, hecto, 100 times, kilo, 1,000 times, and myria, 10,000 times; while, for the fractions, deca means the 10th part, centi, the 100th, and milli, the 1,000th part; the Greek numerals being used for the multiples, and the Latin for the fractions.

In adapting the system to this country, the French words should be anglicized; this is already done with *metre* and *gramme*, which have beeome "meter" and "gram," and we should change *litre* to "leter;" this class of monosyllables being the most difficult words in the French language for the tongues of foreigners.

Which one of our members of Congress will send his name all over the world, and down to distant posterity, linked with the practical adoption of this great reform?

COMBINATION LAMP AND MATCH BOX.

The adjoining pretty little picture illustrates an invention (made by Thomas Shanks, of Baltimore, Md., and patented Jan. 19, 1858) which is designed for the convenience of all those hundreds of thousands of persons who have occasion to light a lamp in the night.



The base, A, of the lamp is made hollow to receive the drawer, B, which is drawn into its receptacle and held in place by a spiral spring. The button, C, by which the drawer is pulled forward, is on the end of a small rod which has the bent catch, D, at its opposite end, which may be turned up by turning the button, to hold the drawer open as long as may be desired. The drawer has a sand or emery plate in front for lighting the matches, and a longitudinal partition separating it into two compartments—one for the matches and the other for the burnt sticks.

Any further information in relation to this lamp and match box combination may be obtained by addressing the inventor as above.

MANUFACTURE OF CIDER IN CONNECTICUT.—Very few are aware of the extent to which the manufacture of cider is carried within a few miles of New Haven. In conversation with a gentleman from Cheshire, a few days ago, we were surprised to learn that, in that town, 5,000 barrels have been made the past season from apples raised in that and adjoining towns, nearly all of which is now in process of clarification and will be ready for market early in the spring. Four establishments alone have made from 1,500 to 2,000 barrels each, which are already disposed of, and will be sent to market as soon as ready for use. This, when clarified, is as pure as wine, and is sold readily in New York, to bottle, for $4 per barrel for the liquid, and when bottled is in great demand at the South at $5 per dozen. The business is rapidly increasing, and the cultivation of the apple is likely to prove as profitable as that of the grape in the West, where thousands of dozens of wine are put up yearly. The cultivation of the grape at Cincinnati has increased within a year or two extensively, and although attended with a much greater expense, is now the most profitable crop of that locality. The fruit-growers of Connecticut can cultivate the apple with but little expense, and can realize at least 20 cents a bushel for all they can raise. The past season those who have mills at Cheshire have paid from 18 to 20 cents per bushel for all they could find; taking them from the orchards in which they have been collected, the raiser being subjected to no expense except that of picking and piling in heaps.—*New Haven Journal.*

CHINESE SUGAR CANE AS CATTLE FEED.

In regard to the use of this plant for feeding cattle, the following opinions are given in a late number of the Irish *Agricultural Review.* They deserve attention because they are quite opposed to the general opinion entertained in America:—

"We have been favored by some of our correspondents with the results of their experience in the culture of the above-named recently-introduced forage plant; but, with the exception of an occasional observation that cattle do not refuse it, we have as yet learned little of its economical value. The sorgham has been cultivated on the continent for a longer period than with us, and some of the statements in foreign agricultural periodicals are anything but favorable. Thus in the *Journal d'Agriculture Pratique* for January last, the Marquis de Vibrave, in a communication to the editor, states that it injuriously affect scattle that are fed upon it. He refers more especially to an experiment in which 25 milch cows were fed for a month exclusively on sorgham, in which period the milk given by them only averaged half the quantity they were giving at the commencement of the experiment. He further states that some of his acquaintance's cows which were fed principally on this plant became stertile; and in one instance he knows of its having caused the distention of the paunch, known as hoven; and therefore, with much regret that the truth compels him to report so unfavorably of a plant which by its abundant productiveness promised to prove an invaluable auxiliary to the other means of providing green food for cattle, he cautions farmers against the two liberal use of it, and solicits at their hands renewed experiments with respect to it."

TO CURE LOCKJAW.—A discussion has been going on among the medical men of France, on the advantages of the use of the woorali poison in cases of lockjaw. Woorali is obtained indifferently from various lianas or vines proper to South America. The plant is boiled in water, which is afterwards slowly evaporated, until the residue assumes a viscous, gummy form. This may be swallowed with impunity, but when introduced into the circulation by wounds is most deadly. The natives of Demerara poison with it the delicate bamboo arrows blown from hollow reeds, wherewith they kill game in the vast tropical forests of that region. The animal struck by one, however slight the wound inflicted, is sure to die painlessly in a few minutes by a species of of paralysis. Should the hunter accidently graze himself with the envenomed point, ignorant of a remedy, he resigns his weapons to his companion, and lies down calmly to await death. The Indians of the Orinoco assert that salt taken internally is a specific against this poison. They use it both in the chase and in war. Humboldt states that, though seemingly unarmed, the Indian of the Orinoco kills with a poisoned thumbnail, impregnated with the woorali, so that a scratch from it would be fatal to his enemy. This poison appears to have nearly the same constituent as strychnine, though affecting the animal organization differently, since strychnine convulses, while woorali paralyses the system. They neutralize each other. It is on the theory of counteracting the convulsions of tetanus, by the paralysing power of woorali, that the use of this dangerous agent has been advocated by some as warmly as it has been deprecated by others. Sufficient data have not yet been accumulated to jusitfy a decision, though certainly some cures of this dreadful disease seem to have been effected by it.

ROSA BONHEUR'S HORSE FAIR.—Messrs. J. M. Emerson & Co., No. 37 Park-row, this city, have published a lithograph engraving of this famous painting, 13x25 inches in size, which they give as a premium to each of the subscribers to the *United States Journal.* Any person inclosing $1.15 to the publishers, as above, will receive the engraving by return mail, carefully rolled in a strong tube and prepaid, and the *Journal* for one year. The lithograph was executed by Sarony, Major & Knapp, 449 Broadway. It seems to us that the outlines are not well defined, but it is a very spirited and, on the whole, admirable lithograph, richly worth the money that it costs, to say nothing of the *Journal.* The painting is in the fine gallery of its owner, that eminent patron of art—Mr. Wright, of Hoboken.

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AMERICAN TIMBER FOR SHIPBUILDING.

We copy the following from our able cotemporary the Boston *Traveler*. It comes very opportunely as a forcible reply to a leading article in the London *Mechanics' Magazine* (Dec. 16, 1859), in which the case of the *Minnesota* is taken up to decry the character of American timber-built ships, as being inferior to the same class of English vessels in durability. It will be seen that the *Mechanics' Magazine* quoted the article referred to from our columns, and advocated the superior durability of English timber-built ships, with a great amount of solid statistics, which do not appear to be capable of easy refutation; still, as the attack is principally against Mr. Donald Mackay's writings, relating to American and English-built ships, he is capable of answering for himself, and will no doubt effectually do so. The *Traveler* says:—

A few months since we published an article upon the defective and rotten condition of a portion of the planking and ceiling of the steam-frigate *Minnesota*, now undergoing repairs in Charleston navy yard, because we believed our Navy Department had been imposed upon by the parties who furnished the timber, which had decayed so rapidly. The article was extensively republished in English papers, and was referred to as an argument against the use of American timber for shipbuilding. Now such an inference, from our remarks, is not logical, neither can it be sustained by the facts of experience. We cited the *Minnesota*, as an exceptional case, and expressed our surprise that she should have been planked with such timber, when so much timber of undoubted quality could be easily obtained. The contract to furnish her planking, was probably a political job, which the navy yard officers knew how to manage without running the risk of being removed. On the other hand, the planking and ceiling of the frigate *Merrimac*, built in this vicinity, was properly seasoned before used, and a sounder ship cannot be found anywhere. The same may be said of nearly all our ships-of-war. Take for example the old line-of-battle ship *Ohio*, now at Charleston; we believe there has not been a plank put into her for 20 years, if not 30. The *Vermont* is equally sound. In a word, with one or two exceptional cases, the causes of which are known, our navy is probably the most durable in the world, because the timber of which the ships have been built, is the best. Our live oak is harder than East India teak and as durable, and of this, our navy is framed; our white oak along the seaboard is so inherently sound that it may be used without seasoning, and our hard pine knows no decay, but tear and wear. Our navy yard authorities, who have made the qualities of wood the special subject of experiment, assure us, that our white oak for the purpose of shipbuilding, is not only stronger, but more durable, than either English or African oak, and that our live oak is unrivaled the world over.

In support of these assertions we may refer the English to the condition of the frigate *Essex*, which they captured in 1814. She was built in 1798, and continued fit for service, without any sign of decay, to 1837, when she was sold, not because she was unsound, but because a new class of vessels superseded that to which she belonged.

We believe that English and African oak and East India teak are good woods for shipbuilding, and that the condition of the ships of the English navy is generally sound, yet there are cases of rot which might be cited, as exceptional, not to prove that their timber was naturally and inherently bad—as the English have asserted to be the case, because the *Minnesota's* planking was partly defective and decayed—but to show that the timber had not been properly seasoned, or had been subjected to influences out of the ordinary course. The frigate *Vernon*, is a case in point. Built with the utmost care, under the immediate inspection of Sir Wm. Symonds, at the end of four years, she was found very rotten. We believe she has since been condemned. The *Foudroyant*, line-of-battle ship, in four years had to be nearly re-built, in consequence of dry rot. The *Eden*, of 26 guns, in two years was so decayed that it was necessary to remove all her wales, the sheer-strake, and a considerably portion of her topsides. Large quantities of fungus covered her timbers. The *Isis*, built in 1840, seven years afterwards had 78 timbers taken out rotten; all the ceiling in the hold; mast-steps, and timber strakes, were also decayed. Several other cases, even of a recent date, might be cited to show that the British navy is not rot-proof; but we will turn from the navy to the merchant-service.

The West India mail steamers, *Clyde*, *Tweed*, *Tay*, and *Teviot*, all first-class vessels, built without regard to cost, within the past six years, in consequence of dry rot, have had to be repaired at an expense of $300,000. There is little doubt that dry rot is more general among British than among American shipping, and that the latter last longer because built of more durable materials. The British generally fasten and season their ships more carefully than we do, and provide them with better pumps, and heavier ground tackle, and to these, not to the superiority of timber, may be attributed their age. We refer to the mercantile marine alone; our navy, we contend, though small, is the model navy of the world in the durability of its ships, and to keep it so, is the object of exposing any of its defects, that may come to light, with a view of having them guarded against in future. The SCIENTIFIC AMERICAN which copied the facts in relation to the *Minnesota* from the *Traveler*, will probably be as much surprised as we were, to see that they have been used as an argument against the durability of American ship-timber.

WISDOM FOR WINTER.—Never go to bed with cold or damp feet.

In going into a colder air, keep the mouth resolutely closed, that by compelling the air to pass circuitously through the nose and head, it may become warmed before it reaches the lungs, and thus prevent those shocks and sudden chills which frequently end in pleurisy, pneumonia, and other serious forms of disease.

Never stand still a moment out of doors, especially at street corners after having walked even a short distance.

Never ride near the open window of a vehicle for a single half minute, especially if it has been preceeded by a walk; valuable lives have thus been lost, or good health permanently destroyed.

Never wear india-rubbers in cold, dry weather.

Those who are easily chilled on going out of doors, should have some cotton batting attached to the vest or outer garment, so as to protect the space between the shoulder-blades behind, the lungs being attached to the body at that point; a little there is worth five times the amount over the chest in front.

Never begin a journey until breakfast is eaten.

After speaking, singing or preaching in a warm room in winter, do not leave it for at least ten minutes, and even then close the mouth, put on the gloves, wrap up the neck, and put on a cloak or overcoat before passing out of the door; the neglect of these has laid many a good and useful man in a permature grave.

Never speak under a hoarseness, especially if it requires an effort, or gives a hurting or a painful feeling, for it often results in a permanent loss of voice, or a long life of invalidism.—*Hall's Journal of Health.*

OBEYING ORDERS—FUNNY AXES.—The managers of the Grand Trunk Railway, in Canada, last year, desiring a large quantity of axes for use along the line of their road, and having no confidence in American mechanics, set one of their scientific men to make a pattern of the axes required. The pattern in due time was completed and sent to England, with an order for 2,500 axes after the pattern sent. The house receiving the order went immediately to work to fill it, and a few months ago shipped to the managers of the road at Montreal the axes as ordered. Upon receiving their property, however, the scientific men found that not one ax out of the whole 2,500 had a *hole* in it to receive the handle! They were made according to the order—"exactly like the pattern." They have the axes for sale now in Montreal.

[We clip the above from an exchange, and give it for what it is worth. The managers of the Grand Trunk Railway should know that the best wood-choppers' axes in the world are made in the United States; the English axes cannot compare with them in any respect.—EDS.

RAILROAD ACCIDENTS.—The number of accidents on our railroads last year was 79, by which 129 persons were killed. These do not include those caused by the carelessness of travelers themselves, or from persons crossing or walking on railroad tracks when overtaken by trains.

TAKE CARE OF YOUR EYES!—One of the most eminent American divines, who has for some time been compelled to forego the pleasure of reading, has spent thousands of dollars in vain, and lost years of time, in consequence of getting up several hours before day and studying by artificial light. His eyes will never get well.

Multitudes of men and women have made their eyes weak for life, by the too free use of eyesight in reading small print and doing fine sewing. In view of these things, it will be well to observe the following rules in the use of the eyes:—

Avoid all sudden changes between light and darkness.

Never begin to read, or write, or sew, for several minutes after coming from darkness to a bright light.

Never read by twilight, or moonlight, or on a very cloudy day.

Never read or sew directly in front of the light, or window, or door.

It is best to have the light fall from above obliquely, over the left shoulder.

Never sleep so that, on the first awakening, the eyes shall open on the light of a window.

Do not use the eyesight by light so scant that it requires an effort to discriminate.

The moment you are instinctively prompted to rub the eyes, that moment cease using them.

If the eyelids are glued together, on waking up, do not forcibly open them; but apply the saliva with the finger—it is the speediest dilutant in the world; then wash your eyes and face in warm water.—*Hall's Journal of Health.*

KENTUCKY BLUE GRASS.—There is no subject which deserves more attention from eastern and northern farmers than the best grass as food for their cattle. At the present moment there is a great scarcity of hay in northern and western New York; it is selling for $16 per tun, and many farmers have sold off considerable of their live stock owing to inability to feed them. It is generally believed, now, that too little attention has been paid to raising the proper kind of grasses for cattle feed, timothy being the most common. Now is the time for farmers to discuss and cogitate on the new movements which they should make in agriculture during the present year. We have been informed that the famous Kentucky blue grass would be a great improvement, if cultivated in the eastern and midland States. It bears the summer heats and drouths well in close rich soils, and is a perennial. In western New York, where it has been introduced, it continues green as late as December, affording feed for both cattle and sheep after other grasses have failed to do so. It is a subject worthy of consideration and experiment.

WHEAT STRAW—ITS VALUE AS FODDER.—In regard to feeding wheat straw, Mr. Mechi, the celebrated agriculturist of England, calculates when fed to cattle it is worth more per acre than if plowed in for farm manure. If cut up and mixed with meal or bran of grain, it makes a very valuable food for cattle. Mr. Mechi's method of feeding is as follows:—He feeds each of his own cows, daily, on twenty pounds fine cut straw, eight pounds hay, five pounds rape cake, two pounds bean meal, seven-eights pounds bran, seven-eights maltcombs—all of these being properly moistened in hot water, the straw requiring more than the rest—thirty-five ponnds mangel or Swedish turnips. The essential points are warmth and moisture, the cattle being well sheltered and duly cared for. The straw is a most nutritious food, one hundred pounds of it contain seventy-two of muscle, fat, and heat-producing substances. The soluble fattening substances are equal to eighteen and a half pounds of oil to every one hundred pounds.

POISONOUS TOYS.—A Belgium medical journal gives an account of the narrow escape from death of a child, about a year old, by poison. It appeared to be in dreadful pain, and foamed at the mouth, and upon being taken to an apothecary at Bossu, it was found that it had been poisoned by sucking the painted face of a doll. The white lead in paint is one of the most powerful poisons known, and the journal very properly suggests that toy-makers should be prohibited using poisonous substances in painted playthings.

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THE EVILS OF TRADES' STRIKES.

We take the following from the last number of the *London Quarterly*, it being part of a most able article called forth by the late "strike" among the building trades in London:—

"If strikes and combinations could elevate the condition of labor, Dublin must now have been the paradise of working men. The operatives there, with true Celtic vehemence, have thrown themselves heart and soul into the Unions, and have fought their battles with a devotion worthy of a better cause. Moreover, they have been almost uniformly successful; but their victories have been even more disastrous than defeats. Dublin was formerly the seat of numerous extensive and highly prosperous manufactures and trades. One after another these various branches of industry were ruined by strikes. Flannel, silk, lace, gloves, almost ceased to be manufactured, and the best Irish workmen migrated to England and Scotland. The wretched and poverty-stricken 'Liberties' of Dublin—untroubled by machinery and capital, but infested with pauperism in its most revolting forms—still testify to the ruin inflicted on the trade of Ireland by the combinations of her operatives. O'Connell himself admitted that Trades' Unions had wrought more evil to Ireland than even absenteeism and Saxon maladministration. The monopoly and restrictions enforced by the Dublin unionists were most rigid; but, as usual, their heaviest pressure was upon the working people outside of their combinations, who were sacrificed without mercy. Unskilled labor was paid as low as 6d. a-day in the very shops in which the unionists were striving to keep up their own wages at an unnatural rate. They prescribed a minimum rate of wages for themselves, so that the worst workman should receive the same as the best. They left little or no choice to the employers in the selection of their men; and the master in want of an additional hand had to go to the Trades' Union and take the person who stood first on their register. 'Knobsticks,' or non-unionists were rigidly excluded; and if any unprivileged man ventured to work at any Union trade it was at the peril of his life. Indeed, several poor wretches were assassinated at the expense of the Unions, and the murderers remained undiscovered. No organization could have been more perfect; and its result was ruin. The shipwrights and sawyers carried every point with their masters; and in the course of a few years there was not a single master-shipwright in Dublin. If vessels frequenting the port required repairs, they were merely cobbled up so as to insure their safety across the channel to Belfast or Liverpool. The Dublin iron manufacture was destroyed in the same way. Mr. Robinson, an iron-master, was prohibited by his men from using a machine which he had invented to meet the competition of English-made nails; and the trade in consequence left Dublin, never to return. Another manufacturer, anxious to execute some metal works in Dublin, in order that Irish industry might have the benefit, found to his dismay that he was precluded from competing with England, not by any local disadvantages, or want of coal or iron, but solely by the regulations enforced by his own workmen. It was thus that the iron trade went down. O'Connell estimated that at least half a million a-year had been lost to the Irish capital in wages alone, through the combinations of the unions. Almost the only branch of trade in Dublin against which strikes failed has been that of coach-building; and it has accordingly been preserved. The Messrs. Hutton held their ground with heroic perseverance. The unionists battered their carriages, cut the silks and laces, beat their foremen, and compelled the masters to ride home armed and guarded; nevertheless, they persisted in carrying on their business in their own way, and by this means kept up their splendid coach manufacture, which would doubtless otherwise have been driven out of the island. The strike infatuation ruined the trade of other districts in Ireland. An Irish capitalist erected a costly manufactory at Bandon, and succeeded in obtaining a large contract. He bought machinery; the workmen worked till it had been erected, and then struck for increased pay. 'We know,' they said, 'that you have got a contract in Spain and Portugal, and you must, therefore, give us higher wages.' The proprietor gave the increase demanded, worked out his contract, and then abandoned the manufactory. The consequence was a loss to the Bandon work-people in wages of about £12,000 a-year. Dr. Doyle stated before the Irish Committee of 1830, that the almost total extinction of the blanket trade of Kilkenny was attributed to the combinations of the weavers. No sooner was it known that any manufacturer had taken a contract than the weavers immediately insisted on an advance. The consequence was that manufacturers would not enter into contracts; they withdrew their capital, the blanket trade was ruined, and weavers became paupers, and had to be maintained at the public expense. Such are only a few illustrations of the triumphs of strikes in Ireland."

THE WAY THE TEMPERATURE OF OUR BODIES IS REGULATED.

For thousands of years before mankind knew anything of the property of heat to become latent, our Maker had been using this property to adjust the heat of our bodies. The supply of heat to our systems is furnished by the lungs, which operate precisely like a small furnace, producing a slow fire in our breasts, burning the carbon in the fat and other portions of our food, and thus generating a constant supply of caloric. The heat thus produced varies in amount; when we are exercising violently our breathing becomes more rapid, and thus the fire in our lungs is fanned, and the quantity of heat generated is greater than when we are at rest. As it is necessary that the several fluids and solids of which our bodies are composed should be kept at a temperature of about 98°, provision had to be made for carrying off this heat in quantities proportioned to the supply. A part of it is constantly going off by radiation. It is the nature of heat, as soon as it is produced, to fly away in every direction in straight lines, with a velocity of about 200,000 miles in a second; if it meets any body which has a nature adapted to absorb it, it enters into the body, making it warm; if it strikes a reflecting surface, like polished steel, it rebounds from it as an elastic ball does from the side of a building; and if it meets no obstruction, it speeds its straight and swift flight away into the depths of infinite space. It is not, however, by radiation that the temperature of our bodies is adjusted, but by evaporation. If we place an open vessel of water over a fire, we can never raise the temperature of the water above 212°, however intense may be the heat of the fire. At 212° water changes from the liquid condition to that of vapor, and in this change it absorbs and renders latent about 1,000° of heat. If we take a mass of water of the temperature of 212° and pass 1,000 degrees of heat into it, the water will all be changed into vapor, and the vapor will be no hotter, sensibly, than the water was before it had received this great quantity of caloric; the 1,000° of heat have been absorbed and hid, or rendered latent. It is consequently very easy to keep any vessel, or any substance, at a constant temperature of 212° by simply placing it in a water bath. If it had been desired to keep our systems at this temperature the process would have been simple: our lungs would have been made sufficiently large, and the supply of caloric sufficiently abundant, to keep the blood in our veins literally boiling. But the temperature required for the proper action of our muscles and the proper operation of the various viscera of the system is not 212° but 98°, and to maintain this temperature, nature makes use of the same property which substances have of rendering heat latent by their passage from the liquid to the aeriform state, which we use in the water bath. There is no man living who has not had many barrels of water pass out through the pores of his skin in the form of invisible vapor—insensible perspiration, as the physiologists call it. It takes 1,000° of heat to create this vapor from the water of which it is formed. When we are at rest and the action of our lungs is moderate, the insensible perspiration is correspondingly slow, and when a more rapid action of the lungs generates a greater amount of heat, the perspiration is correspondingly increased; and in this way the temperature of our bodies is regulated.

SOME STATISTICS OF TOBACCO.

The Dean of Carlisle has recently delivered a lecture in England upon the subject of tobacco, from which we gather some interesting statistical information concerning the use of the weed in that and other countries.

In 1856, thirty-three millions of pounds of tobacco were consumed in England, at an expense of £8,000,000, to say nothing of vast quantities smuggled into the country. There is a steady increase upon this consumption, far exceeding the cotemporaneous increase of population. In 1821, the average was 11.70 oz. per head per annum; in 1851 it had risen to 16.36, and in 1853 to 19 oz., or at least at the rate of one-fourth increase in 10 years. There are 12 city brokers in London expressly devoted to tobacco sales, 90 manufacturers, 1,569 tobacco shops in London, 7,380 workmen engaged in the different branches of the business, and no less than 252,048 tobacco shops in the United Kingdom. And if we turn to the continent, the consumption and expenditure assume proportions perfectly gigantic. In France much more is consumed in proportion to the population than in England. The emperor clears 100,000,000 francs annually by the government monopoly. In the city of Hamburg 40,000 cigars are consumed daily, although the population is not much over 150,000; 10,000 persons, many of them women and children, are engaged in their manufacture; 150,000,000 of cigars are supplied annually, a printing press is entirely occupied in printing labels for the boxes of cigars, &c., and the business represents £4,000,000. In Denmark the annual consumption reaches the enormous average of 70 ounces per head of the whole population; and in Belgium even more—to 73 ounces, or 3 pounds and 3-5ths of a pound per head. In America the average is vastly higher.

It is calculated that the entire world of smokers, snuffers and chewers, consume 2,000,000 of tuns of tobacco annually, or 4,480,000,000 of pounds weight—as much in tunnage as the corn consumed by 10,000,000 Englishmen, and actually a cost sufficient to pay for all the bread corn in Great Britain. Five millions and a half of acres are occupied in its growth, the product of which, at two pence per pound, would yield £37,000,000 sterling. The time would fail to tell of the vast amount of smoking in Turkey and Persia—in India all classes and both sexes indulge in this practice; the Siamese both chew and smoke, in Burmah all ages practice it—children of three years old and of both sexes; China equally contributes to the general mania; and the advocates of the habit boast that about one-fourth of the human race are their clients, or that there certainly are one hundred millions of smokers!

LATEST DISCOVERIES IN AFRICA.

A letter was read before the American Geographical and Statistical Society, on the 5th inst., addressed to that body by the celebrated African traveler, Dr. Livingstone, under date of "Tette, Zambesi, Feb. 22, 1859," in which he gives some interesting particulars of his latest discoveries. Referring to his explorations of the Zambesi river, he says:—

"We are all quite sure now, that, during at least eight months of each year, a steamer of four or five feet depth of draught could trade without embarrassment. The reason why so little has been known about the Zambesi may have been the branching in the stormy promontory, by which it was hidden from navigators. And these easy-chair geographers, dreaming over the geography of Ptolemy, actually put down the Zambesi as flowing into the sea at Quilimane, which in his days it probably did, though not a drop of Zambesi water in ordinary circumstances reaches that port. Had some branch of the Anglo-Americans planted their footsteps on its banks, the world would have known all about it long ago; and no one would have ventured to play with the river as has been done, making it loose itself and flow under the Kalahari desert."

Dr. Livingstone and his party ascended a branch of this river, the "Shire," and he gives some account of the people and things along its banks, thus:—

"So far as we can ascertain, this river has never been explored by Europeans before. One part of the luxuriant valley of the Shire is marshy and abounding in lagoons, in which grow great quantities of the lotus plant. The people were busy collecting the tubers, which when boiled or roasted, resembled chestnuts. They are thus real Lotophagi, such as are mentioned by Herodotus. Another part of the valley abounded in elephants. Herd upon herd appeared as far as the eye could reach; and noble animals they were. We sometimes chased them in our little steamer; for the Shire branches off occasionally, and forms islands. The upper part of the valley is well peopled, and many of the hills are cultivated high up. But never having seen Europeans before, they looked on us with great suspicion. They watched us constantly, well armed with bows and poisoned arrows, ready to repel any attack, but no incivility was offered when we landed, nor were our wooding parties molested.

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The greatest coward fires first; so, thinking we had as much pluck as they, we did not lift a gun, though we saw them ever-ready to fire, or rather shoot. We did nothing to make us ashamed to return, and if we have their confidence, we may go further. They had abundance of provisions and sold them at a cheap rate; also cotton of two kinds—one indigenous, short in the staple, but very strong and woolly to the feeling—the other very fine and long in the staple. We brought a number of specimens of their spindles and yarn, and, as it was quite equal to American uplands, did not offer them any American seed. The cotton plant is met with everywhere, and though burned down annually, springs up again as fresh and strong as ever. They grow sugar cane too, bananas, manioc, &c. The men are said by the Portuguese to be very intelligent, but very wild. The women wear the lip ornament, which is a ring, about four inches in circumference, and nearly a quarter of an inch thick, passing through a hole in the lower lip, which is thus made to protrude frightfully. I am thus particular, [the doctor is somewhat waggish], in case our own ladies, who show a noble perseverance when fashion dictates, may wish to adopt lip ornaments."

Of the climate, and the health of the party. Dr. Livingstone, in conclusion, writes as follows:—

"We were warned by the fate of the Niger expedition not to delay among the mangrove swamps of the delta—the very hot-beds of fever. We accordingly made all haste away, and we took daily a quantity of quinine. The period of the year which I selected, though not the most favorable for navigation, was the most so for health, and thank God our precautions were successful. The Kroomen, from Sierra Leone have had more of it than we, until a short time ago, when it was the most unhealthy season of the year even to the natives. Three of us have had touches of the complaint, but are all now quite well. I have never had a day's illness since my return. We find too, that, so far from Europeans being unable to work in a hot climate, it is the want of work that kills them. The Portuguese all know that so long as they are moving about, they enjoy good health, but let them settle down, and smoke, or drink brandy, fever follows and the blame is all put on the climate."

This letter was written in acknowledgment of the author's election as a corresponding member of the American Geographical and Statistical Society.

At the same meeting Mr. Folsom introduced M. Du Chaillu, the African traveler, who read a paper detailing his adventures for four years in Central Africa, under the meridian, among the cannibal and other tribes. The trade of these savages, he said, seemed to be confined to an exchange of dead bodies on which to feed. Human bones were found in large quantities, everywhere around their villages. He was never in danger amongst them, inasmuch as he was regarded as a magician, and they were afraid of him. The tribes of negroes in Central Africa, other than the cannibals, were numerous. He had visited 35 of them, but found, notwithstanding that, the country was generally very sparsely populated.

The gorilla, that terrible monster which bears such an unpleasant likeness to man, formed perhaps the most interesting topic of M. Du Chaillu's lecture. Its existence was long doubted by naturalists, and to America belongs the credit of discovering, or rather re-discovering it. The lecturer exhibited the skull of one of these animals, and gave a description of their habits, size, strength &c., in terms with which, from their frequent publication, readers are sufficiently familiar, but which were listened to on this occasion with new interest from the fact that the speaker had seen and shot them in their native haunts. Their tremendous roar, he said could be heard four miles off, and the beating of their hands upon their chest (a mode of expressing their anger) is audible at a distance of one mile.

THE "DIAMONDS" OF PENNSYLVANIA.—The shipments of coal from the different coal regions in Pennsylvania, except the western part of the State, amounted last year to 7,804,000 tuns, which, at $3.50 per tun in this market, would make its value over $27,000,000. Adding about 4,000,000 of tuns more for the western part of the State, and the value of the entire supply will not be far short of $35,000,000. This is pretty fair for a single product of the State.—*Philadelphia Ledger.*

BOILER INCRUSTATIONS.

MESSRS. EDITORS:—In the inestimable columns of the SCIENTIFIC AMERICAN I often see various recipes for removing the incrustations of steam boilers, the ingredients usually recommended are molasses, hemlock bark, grease, &c. Now it is not my intention to assert that there is no virtue in these materials, or that they have not produced the desired result; for certainly those men who have tried them would not recommend such recipes to the public unless they had been benefited by them; but I must say that *we* have tried all those things with little or no effect; therefore I caution those that rely on hemlock bark or molasses to perform the labor which I think they ought themselves to do. When I say "we have tried all," I mean myself and my firemen, for we work together and are not afraid to take a pick and enter the boiler and pick out the scale; and this, I think, is the only reliable way of doing the thing effectually. I offer this as my experience, not thinking that there is anything new in the advice, or that every engineer does not already know it, but merely to point out a simple fact which, though perhaps well known, is often neglected. J. W. H.

Newburgh, Ohio, Jan. 14, 1860.

[We regret that our correspondent has not given us the minutiæ of his experience with the substances to which he has referred, as being non-effectual in preventing incrustations forming in boilers. We learn from him that astringent substances and molasses placed in boilers fed with "hard" water, to prevent scale forming, have failed with him, although they have proved successful in many cases; and that his present practice is to allow the scale to form from time to time in his boiler, until it acquires a certain thickness; then his engine is stopped, the boiler water is run out, when he with his firemen get into it and pick off the scale with tools. An awful waste of coal takes place in all boilers affected with incrustations, because these are non-conductors. In tubular boilers it is almost impossible to pick off the scales from the tubes; therefore this advice, while it may be good to some persons, is assuredly not to be considered a standard for governing the practice of all engineers. Substances put in boilers to prevent incrustations are, no doubt, lesser evils employed to obviate greater ills; and so far as this view of the question is concerned, we perhaps agree with our correspondent. Our standard remedy for the prevention of incrustations is the use of *pure* water. Those who run steam engines in localities where spring and river waters are "hard," should make large reservoirs and cooling ponds to retain rain water for their boiler feed, or should use some apparatus such as that of Mr. Weissenborn, illustrated on page 113, Vol. XI, (old series) SCIENTIFIC AMERICAN, for purifying the "hard" water before it is admitted to the boiler.—EDS.

DIAMOND CEMENT.—This is a most excellent material for repairing broken china, ornaments, jewelry, and nicknacks. Take half an ounce of gum ammoniac and a tablespoonful of water; melt them together till they form a milky fluid. Then take one ounce of isinglass and six wine-glassfuls of water; boil together till the quantity is reduced one half; then add a glassful and a half of strong spirits of wine. Boil this mixture for three minutes, and then strain it through muslin, adding after, while hot, the ammoniacal fluid formerly made. Finally, add half an ounce of tincture of mastic resin. The cement thus made is best preserved in small phials, in which it sets when cold. When required for use it can be liquified by placing the phial in a cup of boiling water.

WHERE DO SEABIRDS SLAKE THEIR THIRST?—The question is often asked, where do seabirds obtain fresh water to slake their thirst, but we have never seen it satisfactorily answered till a few days ago. An old skipper with whom we were conversing on the subject said that he had frequently seen these birds at sea, far from any land that could furnish them water, hovering around and under a storm cloud, clattering like ducks on a hot day at a pond, and drinking in the drops of rain as they fell. They will smell a rain squall a hundred miles or even further off, and scud for it with almost inconceivable swiftness. How long seabirds can exist without water is only a matter of conjecture, but probably their powers of enduring thirst are increased by habit, and possibly they go without it for many days, if not for several weeks.—*California Spirit of the Times.*

A COLUMN OF VARIETIES.

Starch, sugar and alcohol are all composed of carbon, hydrogen and oxygen; starch containing 72 lbs. of carbon to 80 of oxygen and 10 of hydrogen; sugar, 72 lbs. of carbon to 88 of oxygen and 11 of hydrogen; and alcohol, 48 lbs. of carbon to 32 of oxygen and 12 of hydrogen.....There are in circulation in Great Britain 50,000,000 sovereigns and about 120,000,000 shillings. .... The growth of the English race is attested by the fact that, when George III. ascended the throne, in 1760, the population of the British empire, including the colonies, did not number 12,000,000, but the populations in the Old and New World who now speak the English language may be estimated at 60,000,000.....In our large cities many boys and girls are found in wet seasons sweeping the street-crossings In the city of London these little mud-larks number from 500 to 600 boys. Their earnings and pickings are estimated at about $15,000 a year..... .It is exceedingly difficult to distinguish animals from vegetables among the lower and simpler forms of organic life. Independent motion in one of this class of organisms is so far from being a proof of animal life, that it is rather evidence that the thing is a vegetable.....Microscopic plants and animals are such as are invisible to the naked eye.....The lowest form of microscopic plant consists of a single cell or sac, filled with fluid, and generally containing one or more solid granules. The simplest animal is also a single cell, generally containing no granules. The green slime that spreads itself over stone walls in damp places is made up of one of the lowest forms of plants, consisting of myriads of distinct vegetables, each of which is wholly invisible to the naked eye.....The bright star now seen in the northeast in the early evening is the planet Jupiter. It is nearly opposite the sun, and consequently some 190,000,000 of miles nearer to us than it will be next summer.....The moon, while it apparently revolves from east to west around the heavens with all the stars once in 24 hours, moves from west to east among the stars about 12° in the same time.....In the daguerreotype, the dark parts are the iodide of silver and the light parts an amalgam of silver and mercury.....The hard metal, irridium, which is used for tipping the points of gold pens, is worth, when pure, $120 an ounce—more than six times as much as gold.....California gold is an alloy, 1,000 lbs. generally consisting of about 880 lbs. of gold, about 100 lbs. of silver, and the remainder of other metals.....The word "California" is formed of two Spanish words meaning hot furnace; and any one who has passed a summer in the interior of that State is ready to believe that it is rightly named, though on the coast a fire is needed every day through the year, the summer being just about as cold as the winter.....Strawberries are sold in the San Francisco market every month in the year.....The republic of Florence, in Italy, issued a coin of pure gold (24 carats fine) weighing about one-eighth of an ounce, and for more than 600 years this coin has not been varied in weight or fineness. A helmet of aluminum has recently been made in France. The soldering and gilding were successfully performed and a light and strong helmet produced. It will resist a blow better than brass, but not as well as steel.....The steamer *Vanderbilt* has made the quickest western passage from Europe to America that has ever been made by any ship, and the *Persia* the quickest eastern passage from America to Europe.....The ferry boats plying between New York and Brooklyn are lighted with gas. It is carried in india-rubber receivers.....Some microscopic plants are covered with a thin film of silica, which is so comparatively indestructable that it will last for many thousands of years after the interior is decomposed. There are large beds of rock composed almost wholly of these coverings of minute plants.....According to the "Watchmaker's Manual," just published by John Wiley, of this city, the number of watchmakers in the United States, in 1850, was 2,901.....Mason & Dixon's line is the boundary line between Maryland and Pennsylvania, surveyed by two able and learned English surveyors at the expense of the heirs of William Penn and Lord Baltimore. It cost the Penn family in the neighborhood of $100,000. Mason & Dixon measured an arc of the meridian in the course of their surveys; and this measurement is cited now in works on astronomy, having been one of the measurements by which the figure of the earth was ascertained.

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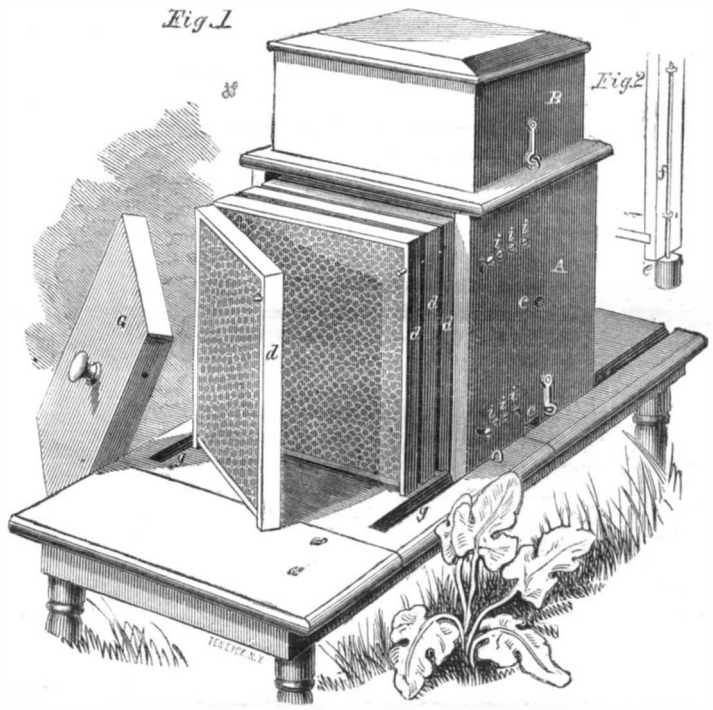
UNDERHILL'S LEAF BEEHIVE.

Sometime ago Mr. Langstroth—who is probably as conversant with the habits of the honey bee as any person in this country—invented a plan for filling a beehive with frames about an inch in depth which were placed about a quarter of an inch apart, with a view of having the bees make their combs in these frames, which might be separately removed when filled with honey, and thus the honey procured in the most beautiful condition possible formarket. The plan was found to work admirably in practice with the exception of one important obstacle; in drawing a frame out from between two others, the comb was apt to be broken, not only in the frame which was being removed, but in the others adjoining, by which the honey was wasted in the hive, and the bees badly irritated. To obviate this difficulty, another person who has passed his life in rearing bees, has invented the plan illustrated in our engraving.

A, is the hive made in the usual manner, with the ordinary box, B, on the top, and proper holes, *c c*, for the entrance of the bees. The frames, *d d d d*, made in the manner described, are connected by a pivot to the table in the manner represented in Fig. 2. A wooden pin, *e*, has inserted firmly into it the wire rod, *f*, which passes through staples in the frame, so that the frame may swing on the rod, as a door swings on its hinges. The hive, A, slides in the grooves, *g g*, of the table, so that it may be pushed back from around the frames as shown in the cut. When it is desired to examine the interior of the hive, the box, A, is pushed away from the frames, when these may be turned gently outward on their hinges, so as to separate them from each other, and if one of them is found to be filled with honey, it may be removed without any damage to the comb, and its place supplied with an empty frame. A strip of tin a quarter of an inch in width projects vertically downward along the middle of the upper part of the frame, to induce the bees to make their comb in a straight line, a plan which was discovered by accident, and which is found to be perfectly successful in practice. The capacity of the hive inside may be adjusted to the size of the swarm by means of the movable side, G. A series of holes are made and stopped by the movable pins, *i i i i*, and the slide, G, is pushed in as far as desired opposite any of these holes, when pins are inserted to hold it in place; the proper amount of frames of course being removed to make room for the admission of the adjustable slide. When the hive is closed, the box, A, is held in place by means of a hook and staple.

The patent for this invention was issued (through the Scientific American Patent Agency) on December 13, 1859, and persons desiring further information in relation to it, will please address the inventor, T. S. Underhill, at St. Johnsville, N. Y.



UNDERHILL'S IMPROVED BEEHIVE.

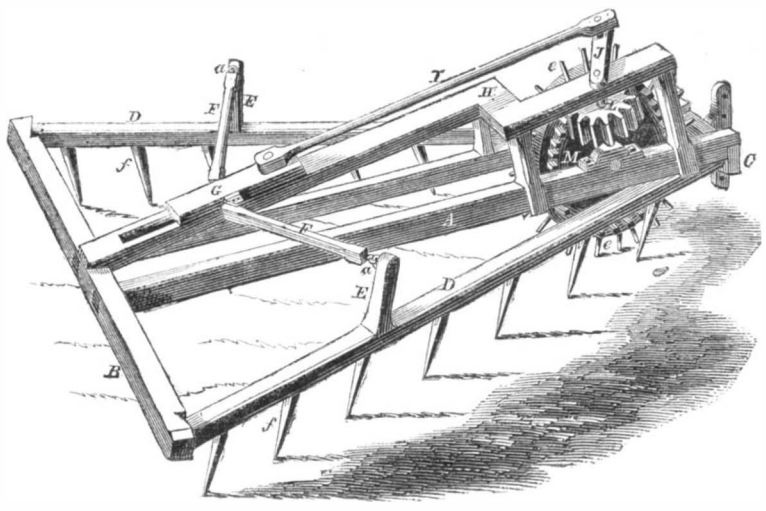
LIGHTNING ACCIDENTS IN 1859.

The following are statistics collected by E. Merriam, of Brooklyn, and published in the *Journal of Commerce*, this city:—

"In the year 1859, 76 deaths were recorded (on the land), and 41 persons were injured by lightning, of whom three were not expected to recover. No death by lightning is reported, in the field of our research within the year 1859, in a building or vessel furnished with metallic lightning conductors, reared for the purpose of protection. Four deaths only have been reported by lightning in buildings having lightning rods, within a long series of years covered by our record; and the cause of these four, no doubt, was explained by the lightning in the marks it left on the buildings, could we have seen them soon after the several occurrences. Persons within steamboats, within railroad cars, iron vessels and iron buildings, and telegraph operators while operating with the wires, continue to enjoy absolute protection from lightning; no death by lightning ever having been reported in a steamboat, railroad car, iron vessel or iron building, or to telegraph operators, since the introduction of these several useful inventions. The knowledge of these facts may have the effect to quiet the minds of very many persons who entertain fears during thunderstorms."

NEW VIBRATING HARROW.

The object of this invention is to give a vibratory motion to the teeth of a harrow, and thus pulverize the soil more perfectly than is done by the ordinary harrow.



PATTERSON'S IMPROVED VIBRATING HARROW.

The two side-pieces, D D, shown in the cut, are pivoted at their ends, so that they may receive a rocking motion, and thus cause the teeth to oscillate transversely to their course. To produce this rocking of the pieces, D D, the uprights, E E, are mortised firmly into them, and are connected at the top by the rods, F F, with the block, G, which has a sliding motion on the beam, H. This sliding motion is imparted to the block, G, by means of the rod, I, which is connected with the crank, I, on the axle of the pinion, L. This pinion meshes into the gear of the wheel, M, the pins, *e*, of which enter the earth and cause the wheel to receive a rotary motion as the harrow is drawn along. The vibratory motion thus imparted to the teeth tends to free them from any clods or sticks which they might otherwise gather, also to work them more easily through the soil.

An application for a patent has been made on this invention through the Scientific American Patent Agency, but it has not yet been granted. Persons desiring further information may address the inventor, N. A. Patterson, Kingston, Tenn.

"ARE YOU INSURED?"

This is an inquiry which almost invariably greets the eye of the visitor to our large mercantile houses. It is placarded in large letters upon the walls of the store, as if to say, "We have no confidence in merchants who do not keep their stock well insured." During the year 1859 the losses which have resulted from fires occurring within the United States cannot be estimated at less than $17,000,000. There were 42 fires during the year, each consuming property varying from $100,000 to $800,000. We have before us a letter from an old correspondent, announcing that he can no longer take the paper, having been wholly ruined by a recent fire which consumed his shop, stock and tools, on which there was no insurance. We are pained to hear of his calamity, and if there had existed no remedy against it, our regrets would have been still deeper; but there was a remedy within his reach, though he failed to adopt it, and is now suffering the dire consequences. Every mechanic, manufacturer, and householder ought to insure. It can now be effected upon most classes of property at very reasonable rates, and there is no excuse for not doing it. There are responsible insurance companies in this and other cities in which it is safe to insure property. We could name at least fifty good companies in this city, which furnish security ample to cover all losses accruing against them, and we urge all our readers to think of this matter in time and provide for the possible contingency of loss of their property by fire. What if your neighbor has lived in the same house and done business in the same shop or factory for 20 years, and was never burned out? To-morrow morning his house, shop or factory may be in ashes, and the ruins will re-echo with the old cry of "No insurance." We repeat, there *is* a remedy, and we advise all to seek its advantage.

BREWING AND THE YEAST PLANT.—The article on our first page contains a brief and plain account of the art and science of brewing. Some very curious and interesting facts will be found in it, especially in relation to the growth of the yeast plant. Yeast consists almost wholly of a certain microscopic vegetable, and its quantity is increased in fermentation by the growth of this vegetable.

COUNSEL TO INVENTORS.—Inventors, patentees, and those interested in patents and desire counsel upon any questions relating to Re-issues, Infringements, Interferences or Extensions, are advised to seek the counsel of the Proprietors of the SCIENTIFIC AMERICAN, who, in connection with the Hon. Judge Mason, the late *Commissioner of Patents*, are prepared to thoroughly investigate such matters in the most careful manner. Our facilities for the transaction of all business connected with the Patent Office are unequaled by any other existing agency. We are at all times prepared to receive and examine sketches and descriptions of alleged new inventions, and will advise inventors as to the probable novelty of their devices.

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Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY

At No. 37 Park-row (Park Building), New York.

O. D. MUNN, S. H. WALES, A. E. BEACH.

TERMS—Two Dollars per annum.—One Dollar in advance, and the remainder in six months.

Single copies of the paper are on sale at the office of publication, and at all the periodical stores in the United States and Canada.

Sampson Low, Son & Co., the American Booksellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.

☞ See Prospectus on last page. No Traveling Agents employed.

VOL. II., No. 4.....[NEW SERIES.].....*Fifteenth Year.*

NEW YORK, SATURDAY, JANUARY 21, 1860.

A LAW THAT CANNOT BE EXECUTED—CONGRESSIONAL BLINDNESS ABOUT PATENT MATTERS—REFORMS WANTED.

HE members of the last session of Congress appear to have been strong believers in astounding achievements in the art of book-making. A story is told of a London populace once flocking in crowds to witness an exhibition at which a mountebank, by flaming placards, had promised to perform the wonderful feat of squeezing himself into a quart bottle. We do not think that the members of the last session were in London during this particular occurrence, but had they been there, in all likelihood they would have followed the multitude to the impossible bottle scene. We thus judge because, at the last session of Congress, a resolution was passed making provision for the publication of the mechanical portion of the report of the Patent Office, but containing the requirement that it was not to occupy more than 800 pages of the usual form and size. Into such a limited space, engravings of all the patents issued during the year, with their descriptions, were to be packed and printed—a feat equally as difficult of execution as the promise of the quart bottle squeezer. The Secretary of the Interior, like a good public servant, endeavored to carry out the resolution of Congress, but in his report, published on page 19 of our present volume, he tells the members that, although he was very anxious to comply in all respects with their expressed will, and he had given the subject an unusual degree of attention, yet "a literal compliance with the law was a physical impossibility." This fact, we regret to state, affords disagreeable evidence of a great want of intelligence on the part of members of Congress in reference to the wants of inventors, the progress of American art and science, the operations of the Patent Office, and the legislation required to promote its best interests.

It is not out of place here to advise them to make themselves better acquainted with the beneficial operations of our Patent Office, and the great influence it exercises in developing the wealth and genius of our country. We are confident that if they investigate this subject with judicious care, they will enact such a bill at this session, for reforming the Patent laws, as will do them great honor. This is a subject altogether unconnected with party politics; it relates to national progress in art and science; and it is therefore of interest to every citizen, and should receive a prompt and generous consideration.

The Secretary of the Interior states that the attention of Congress has been earnestly invoked for several years past to certain amendments in the existing Patent laws which experience has proved to be "highly important, if not absolutely necessary, and committees have approved these amendments, and reported in favor of their adoption, but in every case Congress has failed to consider and act upon the reports." These are facts which cannot be gainsayed; they are blots upon the character of former sessions of Congress, which the members of the present session ought to wash out. Will they do it?

Two special reforms in the Patent laws are held to be early and absolutely demanded. One is provision for an increase of the examining corps, and other necessary assistance in the Patent Office, to execute the business which comes before it quickly and carefully. It has been found by experience that when the Patent Office drags behind in its work, so that it is unable to examine and act upon applications for patents promptly, invention and discovery drag behind in relative proportions. This is clearly set forth in the report of the Secretary of the Interior, and is a fact peculiarly deserving of great attention.

The other reform is a reduction of patent fees to foreigners. The attention of our government has lately been called to this feature of our laws by the British minister at Washington. The sum of $500 is now charged as the patent fee for a British subject, while in England there is no discrimination between an American and a native-born Briton. There are other reforms required in the Patent laws to which we may advert at some future time. Our object at present is principally to direct the attention of members of Congress to the necessity of an early examination of this subject. In conclusion, we must inform the members of Congress that the inventors of our country are now a large, worthy, and most useful class, and they have a right to claim a due share of legislative attention. They have also just grounds of complaint that their interests have been too long neglected and overlooked for discussions and legislation upon very paltry subjects compared with the encouragement of genius and the advancement of American art and science.

ENGINEERING PRECEDENTS.

This is the title of certain practical works which B. F. Isherwood, Chief Engineer of the United States Navy, has given to the public; the information contained in them being principally his own accumulated experience. The first volume published related chiefly to the propellers and engines of British gun-boats, and was reviewed by us on page 237, Vol. XIV. (old series), SCIENTIFIC AMERICAN. The second volume is just issued by the same publishers—Balliere & Brothers, this city—and it is of far more general importance to American engineers than the first. It is divided into several sections, embracing the details of distinct experiments which were ordered by the United States Navy Department, and executed by the Board of Naval Engineers, of which the author is a member. Experiments were made with the different kinds of coal to test their evaporative qualities under a boiler at the Brooklyn Navy Yard, and a gain of over six per cent in evaporative effect was obtained by simply admitting air through a number of small holes in the furnace door. Thus, with two kinds of anthracite coal—Blackheath and Treverton—the former evaporated 6.21 lbs. of water per pound of fuel, and the latter 6.99, when air was admitted through minute orifices in the furnace door; while, without such holes, only 5.87 and 6.50 lbs. were evaporated with the same amount of fuel. This is a very important fact for engineers, as by this simple arrangement, which costs nothing, over six per cent of fuel may be saved under all boilers in which "hard" coal is used.

Experiments were also made to determine the evaporative efficiency of horizontal and vertical tubes in boilers, in which great superiority is attributed to the latter tubes. With a maximum rate of combustion, both boilers being equal, the vertical *water* tubes furnished 27½ per cent more of steam than horizontal *flue* tubes—a very great difference, well worthy of general consideration. Mr. Isherwood also made experiments with a peculiar vertical tubular boiler, designed by Thomas Prosser, of Platt-street, this city, in which over 11 pounds of steam were evaporated from 212° (the heat of feed water) with one pound of good anthracite coal. We have not space to de ote further remarks to this part of the book.

Another important department relates to experiments with the use of steam, both without and with expansion. It is generally considered that a great gain is secured by expanding steam in cylinders, and, theoretically, this is easily demonstrated; yet there are many engineers who assert that no saving of fuel is practically obtained by expansion. Such a difference of opinion can only be settled by correct experiment, and we certainly expected to find this question exhausted by these trials, and no room left for argument; in this expectation, however, we are disappointed. The experiments were made with the smithery engine and boiler, at the Brooklyn Navy Yard, and extended over a period of 26 days, averaging nine hours each. During one set, the steam was admitted during the whole stroke, during the other, it was cut off at 22-100ths—a little over one-fifth—of the stroke, and expanded during the remainder. When using steam without expansion, the pressure was 28 6 lbs.; with expansion, it was 34.8 lbs. The amount of coal consumed per horse-power, without expanding, was 14.17 lbs.; with expansion, 11.65 lbs. This is considerable of a gain, yet far from the amount which ought to have been obtained according to the theory of steam expansion. We would have expected in Mr. Isherwood an advocate for a variable and extensive range of expansion, with all the improvements of "cut-offs" and steam jackets, which are necessary to the scientific working of steam, but he has taken up a position of hostility to these, and he is almost a disbeliever in any gain at all being secured from working steam expansively. He takes occasion (without cause) to speak contemptuously of patent "cut-offs," and he asserts that the gain by expansion is restricted "to very narrow limits, even under favorable conditions." He says, in plain language, that "variable expansion gear, with a wide range and the ability to cut off, does not economize fuel more than simple kinds, cutting off longer and attached to smaller engines doing the same work, with the power graduated by the throttle." When the engineering world comes to view the question in this light, then, according to the opinion of Mr Isherwood, "a great step will be taken in the right direction" towards the success and cheapness of operating marine engines.

We have not room to present the arguments and opinions of the above-named author so as to do them justice, but in our opinion the experiments undertaken at the Brooklyn Navy Yard, to test the value of expanded steam, are of little value, because they were not made according to the necessary conditions towards a fair comparison; the engine and boiler were not adapted for working steam expansively according to the most approved practice. As more condensation takes place in the inside of a cylinder in which the steam is expanded than without expansion, it was essential to full success and a fair trial that such a device as the steam jacket should have been attached to the engine at the Brooklyn Navy Yard to fullfil the necessary conditions to success and a fair comparison, with and without expansion. By obviating condensation in the inside of the cylinder of a condensing engine, much back-pressure is prevented when the eduction valve is opened and the cylinder brought into open connection with the vacuum. Mr Isherwood has a very indifferent opinion of the efficacy of steam jackets, yet the careful experiments made by Mr Gordon Mackay, of Paterson, N J.—noticed on page 309, Vol. XIV. (old series), SCIENTIFIC AMERICAN—showed a gain of 20 per cent by the use of that arrangement.

The statements which have been given to the public regarding the great saving effected by the patent "cut-offs" of Sickles, Corliss, and others, which have been described in our columns as new improvements in steam engines, must either be right, and Mr Isherwood wrong, or *vice versa*. But as it regards the great saving effected in fuel by high expansion in properly constructed engines with steam jackets, the account published on page 25 of our present volume completely confutes all opposing opinions. Three steamships running on the South American coast were originally fitted with very good engines and low expansion; they consumed over 1,100 tuns of coal per round trip, and, as the fuel was very dear, the great object of economy was the saving of coal. Messrs. Randolph & Elder, of Glasgow, by removing the old engines and putting in others, having very high expansive qualities, have reduced the fuel one-half—a gain of 100 per cent. This is not theory; it is plain *fact*. It is not an experiment with a very poor smithery engine; but it is a grand, practical, incontrovertible argument. The work of Mr. Isherwood deserves the attention of our engineers; we are confident that it will bring out many opposing opinions to the conclusions of its author; but as he is a very close observer, and possesses great ability as an engineer, he is no doubt fully prepared to maintain the "lists" against all who may choose to attack him.

EXPLOSION OF STEAM PIPES.—The pipe used for heating the packing room of Colt's armory recently exploded, and the condensed vapor greatly injured the large store of arms in the building. The amount of the damage cannot now be definitely ascertained, but the loss is large, reaching thousands of dollars; some estimate it at $17,000. Many of the pistols are badly rusted and the wood is swollen so that they will require to be taken to pieces, cleaned, blued and re-stocked.

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FRICTIONAL GEARING.

The following extract was lately published in the New York *Times*:—

"Frictional gearing is coming into successful use in Great Britain for all purposes, from small machinery up to the driving of the screws of steamships. Instead of one wheel driving another by the intersection or 'mashing' of the 'cogs' or teeth of their rims, the adjacent surfaces or faces of the wheels are grooved lengthwise, or in the direction of their motion, like the rolls of a rolling mill. The grooves are *V* shaped, and the friction of the *Vs* of one wheel against the sides of the *Vs* of the other wheel is so great that the one drives the other, as in the case of cogs. The friction of the journals of the shafts is somewhat greater than in the case of toothed gearing, but in other respects the frictional wheels seem to work most smoothly. The 'back-lash' or rattle of teeth, especially when worn, is prevented. The chief economy is in first cost. The cutting of the teeth of gearing involves the application of abstruse mathematical principles; each side of each tooth is shaped to an epicycloidal curve, varying with the diameters of the wheels. The machines and processes required are extensive and numerous, especially in cases of beveled gearing. But the preparation of frictional gearing is the most simple and straight-forward work of the turning-lathe."

Regarding the exclusive use of this system of driving machinery in England, the accompanying letter throws some new light on the subject:—

MESSRS. EDITORS:—In regard to an article on "Frictional Gearing" which recently appeared in the New York *Times*, and which has been copied into other papers, it is liable to lead many persons to suppose such gearing had never been introduced into this country. It was first used in this section, however, by Mr. William Nichols, who put it up to drive the feed works in a sawmill which he was building. He first tried flat surfaces, but they did not satisfy him, so he took the same wheels and had a V-groove turned in one and the other with a rim to fit it. I think it was entirely original with him, and he considered it an experiment at the time he tried it. The gearing answered admirably and has been in use in Messrs. Bartles & Readin's mill ever since, up to this day. For smoothness of action and the ease with which it is thrown in and out of gear, it is vastly superior to the toothed gear usually in use in sawmills; as a sawyer can, with one hand and very little effort, throw the "feed" out and the "gig-back" in, and *vice versa*. It would also make an excellent arrangement for "jacking" the logs into the mill; in fact, it is superior in any place in which the clutch is now employed. I think that if all your sawmill readers will only try it, they will agree with me in regard to the superiority of the frictional gearing in any situation where it can be used.

H. F. S.

Williamsport, Pa., Jan. 3, 1860.

[Our correspondent does not state *when* Mr. Nichols first introduced frictional gearing into the mill in question, but we suppose it was several years ago.—EDS.

FALL OF A FACTORY---SAD AFFAIR.

One of the most heart-rending events which have ever taken place in this country occurred at Lawrence, Mass., on the 10th inst., by the falling of the Pemberton Mills, an immense cotton factory, by which 115 persons were killed and 165 wounded. The building was 280 feet long, 70 wide, and 5 stories high. It contained 2,700 spindles or spinning frames, several hundred looms, carding machines, any other machinery, and 960 operatives were employed in it. About 600 persons were in the mill when it fell, and that all were not killed appears miraculous. Some extraordinary cases of escape are related, and more persons would have been rescued from under the ruins, but a fire broke out when the walls fell, and many of the poor creatures, who were only covered up under fallen beams and the flooring, were consumed in the flames, and perished in great agony. It is said that the structure was deficient in strength from the first day it was erected. There is no country in the world where life is so insecure, from defective buildings, as the United States. We feel and acknowledge the disgrace.

TO RE-JAPAN OLD TRAYS.—First clean them thoroughly with soap and water and a little rotten-stone; then dry them by wiping and exposure at the fire. Next get some good copal varnish, mix it with some bronze powder, and apply with a brush to the denuded parts. After which set the tea-tray in an oven at a heat of 212° or 300° until the varnish is dry. Two coats will make it equal to new.

WEEKLY SUMMARY OF INVENTIONS.

The following inventions are among the most useful improvements patented this week. For the claims to these inventions the reader is referred to the official list on another page:—

BOOTS AND SHOES.

The object of this invention is to enable the manufacturer to perform the work, which is now done by hand, and to make the entire boot or shoe by any ordinary sewing mechanism for carrying waxed thread, with the exception of putting on the heel, which is a very simple and comparatively easy operation when the sole has been properly attached. This improvement enables the the manufacturer of boots or shoes to put together his work with great facility and a great saving of time is accomplished, there will be less expense attending the manufacture of sewed shoes, and they may be furnished below the present market value of pegged shoes. Another great advantage in this invention is that the entire work of sewing about a boot or shoe can be performed in a neat and perfect manner by ordinary workmen, and those unskilled in the present art of making boots and shoes, therefore the expense of workmen will be much reduced, while the work can be made equal if not superior in strength and durability to those at present furnished to the market. For this purpose the invention consists in sewing the welt or strip of leather to the leather upper, which is previously *fitted* as near the edge of the same as may be found necessary, before the upper is lasted. The patentee of this invention is Francis D. Ballou, of Abington, Mass.

MANUFACTURE OF STEARIC ACID.

In the manufacture of stearic acid, by what is known as the distilling process, the oil, tallow or other crude fatty matter after being washed or otherwise purified, is put into what is called the acidifying pan and therein subjected to the action of sulphuric acid and heat, and when thoroughly acidified, as it is termed, the fat is drawn off from the pan to be distilled, leaving therein the black residuum known as "acid bottoms." This residuum has been known to contain a considerable quantity of fatty matter, and attempts have made to extract it by various means, but none have been found to pay. Attempts have been made to convert the said residuum to various useful purposes but it has never been successfully used otherwise than as a fuel. This invention consists in subjecting the said residuum to a distilling process in which it is exposed to the action of the superheated steam, by which means fatty matter (stearic acid &c.) to the amount of from 20 to 25 per cent by weight of the whole of the residuum may be obtained from it. This invention has been patented to David Thain and William Jackson, of Philadelphia, Pa.

COTTON GIN.

This invention relates to an improved feeding device by which the cotton is presented to the rollers in such a way as to permit of the free escape or discharge of the seed as they are detached and ripped from the staple without permitting any valuable portion of the staple to escape with the seed, and also presented in a layer or bat equal in width to the length of the rollers, whereby the latter are enable to operate in the most efficient manner. It consists firstly in combining a guard with a feed board substantially as hereafter shown, whereby the feeding device is simplified and rendered more efficacious than hitherto. It consists secondly in the employment or use of a corrugated roller in connection with an auxiliary smooth roller in addition to a roller furnished with a smooth yielding surface, against which the two first mentioned rollers bear, whereby the process of ginning by rollers is greatly expedited without in the least deteriorating the staple. It consists thirdly in the employment or use of a discharging device composed of rollers so arranged that the ginned cotton is discharged in a loose light and untangled state. This improvement was designed by Lewis S. Chichester, of this city.

SEWING MACHINES.

Thie invention consists in a novel mode of applying two dogs, the one to move, and the other to prevent the backward movement of the feed wheel, whereby the necessity of the application of a friction brake to the said wheel is dispensed with, and the said wheel, though secured against any tendency to turn it the wrong way, is permitted to turn in the right direction with very little friction. It also consists in certain novel and very convenient means of regulating the feed movement, whereby it may be adjusted before commencing to operate the machine, to produce any lengths of stitch that may be desired. The inventor of this improvement is John Dick, of this city.

CANDLES.

This invention consists in providing a candle with a tubular wick which forms an air channel right through it for the admission of air through the center of the flame, such wick having a lining of sized, starched or glazed paper or other substance sufficiently impervious to the material of which the candle is composed, applied within it, for the purpose of excluding the melted material from its air channel during the burning of the candle and preserving a free passage for the air to the center of the flame till the candle is all burned. The credit of this contrivance is due to Halvor Halvorson, of Cambridge, Mass.

SPINNING FRAMES.

This invention consists in constructiug the ring employed in the spinning frame with a narrow upwardly projecting rim arranged midway or thereabout between the inner and outer margins of the face of the ring. The object of this constrution of the ring is to provide a better bearing for the traveler to keep it in a horizontal or nearly horizontal position than the ordinary flat topped ring, and thereby to cause a more uniform draft upon the yarn in the spinning process. The patentee of this invention is M. P. Wilmarth, of Pawtucket, R. I.

COTTON-SCRAPER.

Among the various implements for the purpose of scraping and weeding young crops, such as cotton, sugar cane, corn, &c., the cotton-scraper of Messrs. Newcomb & Bird is one of the most novel and effective tools which has lately come to our notice. It consists in the employment of a vibrating double acting hoe, that is operated by a vertical rockshaft in such a manner that it cuts both ways in a direction across the row of cotton, corn, or other drill plant, in which the machine runs forward, leaving the weed in bunches the size of which may be varied according to the size of the box. The inventors of this device reside at Smith's Fork, Tenn., and it was patented last week.

HOP FRAMES.

This invention relates to a device for lowering the vines and bringing them within reach, for the facility of gathering the hops, and then for elevating them again to their original position, keeping the horizontal cords or wires, upon which the vines are entwined, under tension all the time. This invention consists in attaching to the posts a vertical strip with a small grooved pulley in its top over which passes a cord, which is attached to a sliding box for elevating and depressing this box, and to this sliding box is connected a yoke provided with a hook which hooks into an eye or loop on the end of the wires forming the frame upon which wires the vines are twined; the object being to tighten up these wires, and to keep them under tension while raising and lowering them. L. A. Beardsley, of Edmeston, N. Y., is the patentee.

ARTIFICIAL LEGS

D. De Forrest Douglas, of Springfield, Mass., has what appears to be a very excellent improvement in Artificial legs, the principal object of which is to enable the knee and ankle to be made with mortise and tenon joints. These joints have been generally admitted to be the best for the purpose, but some practical difficulties which have been overcome by Mr. D. have prevented their being hitherto generally used. This invention is one that cannot well be explained without illustrations, which we hope soon to give.

BORING BRUSH BLOCKS.

This invention consist in the use of a polygonal drum having the brush blocks attached to it, and so arranged as to have an intermittent longitudinal sliding movement, an intermittent rotary movement, and a reciprocating feed movement, said drum being used in connection with drills whereby the blocks may be bored very expeditiously, and a considerable number operated upon simultaneously. The credit of this contrivance is due to Thos. Mitchell, of Lansingburgh, N. Y.

ALARM LOCK.

This invention consists in a novel arrangement of levers and stops with the knob-arbor and an alarm placed within a suitable case and applied to a drawer or till, whereby the drawer or till cannot be illegitimately opened, or an effort made to thus open it, without an

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alarm being sounded. The invention is chiefly designed for tills in stores to prevent the abstraction of money by shoplifters and the like. This improvement was designed by William B. Card, of Sag Harbor, N. Y.

FOREIGN NEWS AND MARKETS.

The Liverpool Cotton Supply Association has recently received sundry samples of cotton and cotton yarn from Africa, forwarded by the celebrated Dr. Livingston. This cotton was grown in the valley of the Shire, which is 100 miles long by 20 broad. The natives spin and weave it for their own use; so abundant is it in this valley that a vast number of cotton trees are annually burned to the ground. The navigation of the Zambesi and the Shire is open to the center of this cotton valley during the greater portion of the year. It is evident, therefore, that a large supply of cotton may be readily obtained from this part of Africa; and the above association are earnestly bespeaking the support of the government to Dr. Livingston, in his efforts to develop what is termed "the vast productive resources of the regions now opened to commercial enterprise."

A paper was recently read before the Institution of Mechanical Engineers (London), by Mr. Benson, of Cincinnati, Ohio, who exhibited a model of the boiler used for the steam fire-engines of that city. The members seemed to consider this boiler a very great improvement for economizing space and weight, by the immense amount of heating surface which it contained. A boiler for an engine, upon this principle, is now being constructed by Messrs. Russell, tube manufacturers, of Wednesbury, England.

Several experiments have lately been made on the Oxford and Wolverhampton Railroad, to test the qualities of brakes for stopping trains. In six experiments with "Fay's brake," at an average speed of 36 miles per hour, the experimental train was stopped in a distance of 507 yards. On a second set of experiments, at the same speed, the train was only stopped within 795 yards from the place where the brake was first applied. A similar set of experiments was tried with "Chambers' brake," which stopped the train within a distance of 731 yards; and experiments were also conducted with two other brakes, namely, "Gasses'" and "Newall's," which only stopped the train within a space of 900 yards.

A new apparatus is now being exhibited in Paris, by M. Vert, to solve the problem of aerial navigation. It consists of a large bag, shaped like a fish, made of gold-beater's skin, and filled with hydrogen gas. The tail of the fish is to serve for a rudder; a small steam engine is placed in a car under it to drive four rotary fans, and these are adjusted to rise and fall on an incline. The great objection to its ultimate success is that every effort yet made to make it fly has not budged it a foot!

The manufacture of condensed artificial manures is now conducted on a very extensive scale in several places in England and Scotland. Ammonia and the phosphates of lime appear to be the principal ingredients of fertilizing value in them. The ammonia is chiefly obtained from gas-works, and the phosphates from caprolites and marl. A great deal of deception has been practiced upon farmers in England (as has also been done in this country) by manufacturers of such manures. They have advertised them as containing far more genuine fertilizing substances than they possessed. Professor C. Cameron, M. D. (editor of the *Irish Agricultural Review*, and a good chemist), has exposed the frauds in adulterated fertilizers and has been presented with a suitable testimonial contributed by a great number of farmers in reward for his exertions to prevent such adulterations. So much for the power of the press and the esteem in which it is held in Dublin.

The Cunard Steamship Company have now no less than eight screw steamers in the course of construction on the Clyde, besides the *Scotia*, which is to be the largest merchant steamer afloat (with the exception of the *Great Eastern*), and its speed is promised to exceed that of any steamship hitherto built.

The metal market is scarcely changed since last week. Scotch pig-iron has declined 1s. per tun, but there has been no other change in iron.

The advance in Banca and Straits tin, noticed in our last issue, is maintained; and perhaps there may be a still further advance, as the total amount of Banca is less this year than the last.

NEW YORK MARKETS.

CANDLES.—Sperm, city, 38c. a 40c. per lb.; sperm, patent, 50c.; wax, paraffine, 50c.; adamantine, city, 18c. a 21c.; stearic, 27 a 28c.

COAL.—Anthracite, $4.50 a $5; Liverpool orrel, per chaldron, $11; cannel, $12.

COPPER.—Refined ingots, 23¾c. per lb.; sheathing, 26c.; yellow metal, 20c.

CORDAGE.—Manilla, American made, 8¼c. per lb.; Rope, Russia hemp, 12c.

COTTON.—Ordinary, 8¾c. a 8¾c.; good ordinary, 9¼c. a 10c.; middling, 11⅛c. a 11⅜c.; good middling, 11¼c. a 12⅛c.; middling fair, 11⅞c. a 12¾c.

DOMESTIC GOODS.—Shirtings, brown, 30-inch, per yard, 6c. a 7¼c.; shirtings, bleached, 26 a 32-inch, per yard, 6c. a 8c.; shirtings, bleached, 30 a 34-inch, per yard, 7c. a 8¼c.; sheetings, brown, 36 a 37-inch, per yard, 5¼c. a 8¾c.; sheetings, bleached, 36-inch, per yard, 7½c. a 15c.; calicoes, 6c. a 11c.; drillings, bleached, 30-inch, per yard, 8½c. a 10c.; cloths, all wool, $1.50 a $2.50; cloths, cotton warp, 85c. a $1.37; cassimeres, 85c. a $1.37½; satinets, 30c. a 60c.; flannels, 15c. a 30c.; Canton flannels, brown, 8½c. a 13c.

DYEWOODS.—Barwood, per tun, $18 a $20; Camwood, $130; Fustic, Cuba, $35 a $36; Fustic, Tampico, $22; Fustic, Savanilla, $19 a $20; Fustic, Maracaibo, $18.50 a $19; Logwood, Laguana, $22 a 23; Logwood, Tabasco, $21; Logwood, St. Domingo, $13 a $13.50; Logwood, Honduras, $16 a $17; Logwood, Jamaica, $12.50 a $12; Lima wood, $65 a $75; Sapan wood, $45.

FLOUR.—State, superfine brands, $5.20 a $5.25; Ohio, common brands, $5.30 a $5.35; Ohio, good and choice extra brands, $5.85 a $6.70; Michigan, Indiana, Wisconsin, &c., $5.35 a $5.50; Genesee, extra brands, $5.50 a $7.45; Missouri, $5.35 a $7.45; Canada, $5.45 a $6.70; Virginia, $6.20 a $7.20; Rye flour, fine, $3.75 a $3.90; corn meal, $3.75 a $3.80.

HEMP.—American undressed, $120 a $150; dressed, from $160 a $200. Jute, $87 a $90. Italian, $275. Russian clean, $190 a $200 per tun. Manilla, 6¼c. per lb. Sisal, 5¾c.

INDIA-RUBBER.—Para, fine, 55c. per lb.; East India, 47c.

INDIGO.—Bengal, $1 a $1.55 per lb.; Madras, 70c. a 95c.; Manilla 60c. a $1.15; Guatemala, $1 a $1.25.

IRON.—Pig, Scotch, per tun, $24 a $25; Bar, Swedes, ordinary sizes, $85 $86; Bar, English, common, $42.50 a $43; Refined, $52 a $54; Sheet, Russia, 1st quality, per lb., 11¼c. a 11¾c.; Sheet, English, single, double and treble, 3½c. a 3⅞c.; Anthracite pig, $23 per tun.

IVORY—Per lb., $1.25 a $1.80.

LATHS.—Eastern, per M., $2.12½.

LEAD.—Galena, $5.80 per 100 lbs.; German and English refined, $5.65 a $5.70; bar, sheet and pipe, 5¾c. a 6c. per lb.

LEATHER.—Oak slaughter, light, 29c. a 31c. per lb.; Oak, medium, 30c. a 32c.; Oak, heavy, 28c. a 31c.; Oak, Ohio 29c. a 30c.; Hemlock, heavy, California, 19c. a 20c.; Hemlock, buff, 15c. a 18c.; Cordovan, 50c. a 60c.; Morocco, per dozen, $18 to $20.; Patent enameled, 16c. a 17c. per foot, light Sheep, morocco finish, $7.50 a $8.50 per dozen.; Calf-skins, oak, 57c. a 60c.; Hemlock, 56c. a 60c.; Belting, oak, 32c. a 34c.; Hemlock, 28c. a 31c

LIME.—Rockland, 75c. a 80c. per bbl.

LUMBER.—Timber, white pine, per M. feet, $17.75; yellow pine, $35 a $36; oak, $18 a $28; eastern pine and spruce, $14 a $15; White Pine, clear, $35 a $40; White Pine, select, $25 a $30; White Pine, box, $14 a $18; White Pine, flooring, 1¼ inch dressed, tongued and grooved, $24.50 a $25; Yellow Pine, flooring, 1¼ inch, dressed, tongued and grooved, $29 a $32; White Pine, Albany boards, dressed, tongued and grooved, $20 a $21; Black Walnut, good, $45; Black Walnut, 2d quality, $30; Cherry, good, $45; White Wood, chair plank, $42; White Wood, 1 inch, $23 a $25; Spruce Flooring, 1¼ inch, dressed, tongued and grooved, each, 22c. a 24c.; Spruce Boards, 15c. a 17c.; Hemlock Boards, 12½c. a 14c.; Hemlock wall strips, 10c. a 11c.; Shingles, cedar, per M. $28 a $35; Shingles, cypress, $12 a $25; Staves, W. O. pipe, light, $55 a $5; Staves, white oak, pipe, heavy, $75 a $80; Staves, white oak, pipe, culls, $30 a $35; Staves, do. hhd., heavy, $70; Staves, do. bbl. light, $30 a $35; Staves, do. bbl. culls, $20; Mahogany—St. Domingo, fine crotches, per foot, 35c. a 45c.; St. Domingo, ordinary do., 20c. a 25c.; Honduras, fine, 12½c. a 15c.; Mexican, 13c. a 15c.

NAILS.—Cut, 3¼c. a 3¾c. per lb.; American clinch, 5c. a 5½c.; American horse-shoe, 14½c

OILS.—Olive, Marseilles, baskets and boxes, $3.30 a $3.40; Olive, in casks, per gallon, $1.12 a $1.25; Palm, per pound, 9c. a 9¼c.; Linseed, city made, 57c. a 58c. per gallon; linseed, English, 57c. a 58c.; whale, fair to prime, 49c. a 52c.; whale, bleached 59c. a 60c.; sperm, crude, $1.40 a $1.45; sperm, unbleached winter, $1.47; lard oil, No. 1, winter, 87½c. a 92½c.; red oil, city distilled, 55c.; Wadsworth's refined rosin, 30c. a 40c.; Wadsworth's boiled oil for painting, 35c a 40c.; Wadsworth's tanner's improved and extra, 30c. a 40c.; Wadsworth's machinery, 50c. a $1; camphene, 44c. a 46c.; fluid, 50c. a 53c

PLASTER-OF-PARIS.—Blue Nova Scotia, $2.75 per tun; white, $3.50; calcined, $1.20 per bbl.

RESIN.—Common, $1.65, per 310 lbs.; strained, No. 2, &c., $1.65 a $2; No. 1, per 280 lbs. $2 a $2.75; white, $3 a $4; pale, $4.50 a $5.50.

SOAP.—Brown, per pound, 5c. a 8c.; Castile, 8¾c. a 9c.; Chemical olive, 7c. a 7½c.

SPELTER plates, 5¾c. a 5¾c. per lb.

STEEL.—English cast, 14c. a 16c. per lb.; German, 7c. a 10c.; American spring, 5c. a 5½c.; American blister, 4½c. a 5½c.

SUMAC.—Sicily, $60 a $80 per tun.

TALLOW.—American prime, 10¼c. a 10¾c. per lb.

TIN.—Banca, 32c.; Straits, 30c.; plates, $6.50 a $9.37½, per box.

WOOL.—American, Saxony fleece, per lb., 55c. a 60c.; American full blood merino, 48c. a 52c.: extra, pulled, 45c. a 50c.; superfine, pulled, 39c. a 43c.; California, fine, unwashed, 24c. a 32c.; California, common, unwashed, 10c. a 18c.; Mexican, unwashed, 11c. a 14c.

ZINC.—Sheets, 7c. a 7½c. per lb.

The foregoing rates indicate the state of the New York markets up to January 11th.

There has been very little change in prices since last week; a slight fall in flour is noticed, and a rise in resin. It is remarkable that the lowest and highest priced resins come from the same stock. Some new discovery, whereby the dark-colored resin could be converted into white resin, would be of incalculable importance, and would be a vast fortune to the inventor.

The quality of Bengal indigo lately introduced into market is said to be very superior; it was difficult to obtain the best qualities a few years ago. Most of the indigo which comes to our country arrives at Boston; the stock on hand at present is sufficient to maintain stationary prices for some time.

Brazil supplies us with the greatest part of our coffee, and New Orleans, Baltimore and New York are the chief ports of this trade. The estimated sales of coffee for consumption in the United States, in 1859, were 1,110,000 bags (a decrease of 900,000 bags from last year), all of which came from Rio.

The receipts of Cumberland coal into Baltimore, during 1859, were 352,821 tuns, an increase of 35,000 over last year. Many of our steam ferry boats, which once burned anthracite, now use the Cumberland coal, which is semi-bituminous, and not so destructive on grate bars and fire-boxes.

Baltimore is our principal copper mart. The quantity of cake and refined ingot copper made in that city, during 1859, was over 8,000,000 pounds, valued at $2,000,000.

GOLD AT THE MINT IN PHILADELPHIA IN 1859.—

Gold from	California	$43,751.00
" "	Kansas	53,919.21
" "	other sources	75.829.24
Total		$173,499.45

During last year 12,275 pieces of gold have been coined, valued at $173,459.68. Of silver there were coined 293,000 pieces, valued at $72,650. Of copper cents there were 2,200,000 pieces, valued at $22,000. A very small amount of the gold received from our mines is converted into coin. Most of it is used in ingots, especially that which is exported. It saves a considerable expense to its owners in paying it out in this form.

INFORMATION IN REGARD TO THE MAILS.—Messrs. Conner & Holbrook, No. 37 Park-row, have commenced the publication of a monthly sheet, giving the following important information in relation to the foreign and domestic mails connected with the New York Post Office:—1st, The rates of letter and newspaper postage of the various weights, to all the countries of the world with which we have mail communication. 2nd, The routes of transmission, and plain directions for superscribing letters for these several routes. 3d, Directions for the registration of letters. 4th, The times of departure of the European, California and Havana mails. 5th, The times of closing the domestic mails—North, South, East and West. 6th, The times at which the domestic mails arrive. 7th, The time occupied in the transmission of mails from distant points to New York city. The work is to be officially reviewed each month at the New York Post-office.

NOT A COUNTERFEIT.—The *Bank Note Register and Counterfeit Detector*, published by T. S. Hawks, of Buffalo, N Y., in speaking of the SCIENTIFIC AMERICAN, says:—"This truly valuable scientific and mechanical paper commences the second volume of the new series with its next issue. It is one of the most useful publications of this country, and should be carefully and attentively read by every class of our citizens, as, in the great variety of subjects presented in its columns, none can read it without profit. But the mechanic and artizan cannot afford to be without it, it treats upon every branch of mechanics, and the information conveyed may be relied upon as sound and correct; there is nothing *counterfeit* about it; it is entirely genuine, bearing the true stamp."

HOW TO ELEVATE MECHANICS.—The enterprising proprietors of Blandy's Steam Engine Works, at Zanesville, Ohio, send us $42, to pay for 30 subscriptions to the SCIENTIFIC AMERICAN for one year. They inform us that they employ about 140 hands in their establishment, and that all the subscribers are from among their machinists. They also add:—"We expect to be able to create a better interest among them for this class of reading, instead of the 'blood-and-thunder' literature so common in this day." This is the right spirit, and is a sure guarantee that good engines and machinery will be turned out of that establishment. There are many other proprietors of machine-shops who might profit by this example and aid us in the bargain.

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ISSUED FROM THE UNITED STATES PATENT OFFICE
FOR THE WEEK ENDING JANUARY 10, 1860.

[Reported Officially for the SCIENTIFIC AMERICAN.]

*** Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

26,742.—Henry H. Beach, of Philadelphia, Pa., for an Improvement in Grain-winnowers:

I claim the arrangement of such a shoe when the steps thereof are made movable in such relation to the fan that the grain passes from the first step at a point from which its gravity would cause it to fall in advance of the fan, and where it is exposed to the greatest strength of the blast, in the manner and for the purpose set forth.

26,743.—Levi A. Beardsley, of South Edmeston, N. Y., for an Improvement in Hop Frames:

I claim the employment of a frame holder composed of a sliding box, K, with a windlass or roller to tighten the wire, and a vertical bed or strip, G, to guide or support the box, K, substantially as and for the purpose shown and described.

26,744.—J. B. Blakslee and S. S. Middlebrook, of Newtown, Conn., for an Improvement in Machinery for Felting Hat Bodies:

We claim the combination of the endless rotating platforms, b and b', when the same are arranged so as to move in opposite directions and at varying speeds, in the manner and for the purpose as herein fully set forth.

26,745.—Thomas Board and C. A. Austin, of Jackson, Va., for an Improved Mortising Tool:

We claim the combination of the auger, C, and hollow chisel, G, with the screw shaft, A, nut, D, bars, E E H H and I I J J, arranged substantially as and for the purpose set forth.

[This invention relates to an improvement in the combined auger and chisel tool for forming rectangular holes or mortises at a single operation. The object of the invention is to obtain a simple means for applying the tool to its work, so that it may be readily adjusted and manipulated, and thereby effect a considerable saving in labor, while performing the work in a perfect manner.]

26,746.—R. B. Brown, of Cambridge, Vt., for an Improved Sawing Machine:

I claim, first, Operating the carriage, G, by means of the pawls, G' H, connected with the adjusting lever, I, and actuated from the saw sash, B, through the medium of the link, h, arm, g, rockshaft, M, levers, L J, and rod, K, substantially as shown and described.

Second, The wheels, j j, when attached to the yielding bar, N, and arranged to operate as described, for the purpose of keeping the work from the saw as it is cut from the log.

[This invention relates to certain improvements in that class of sawing machines in which reciprocating saws are used. The object of the invention is to expedite the working of said class of sawing machines, and facilitate the necessary manipulation attending the operation of the same, by a very simple arrangement of means.]

26,747.—Joel Bryant, of Brooklyn, N. Y., for an Improvement in Journal Boxes:

I claim the construction and use of friction roller journal boxes, when made with a central base, B, substantially as described.

26,748.—James Bullock, of Baltimore, Md., for an Improvement in Horse Collars:

I claim a new article of manufacture, to wit, a horse collar having its shoulder and neck-relieving portion, A A, made throughout of duck cloth, and without a side seam, and mounted with leather, B C, and otherwise constructed after the method described for the purpose described.

[This invention consists in making the supporting part of horse collars of duck cloth and with leather bearings for the irons of the harness. The duck cloth is made into a sack and stuffed with fine straw and then sewed on to the rim or leather portion of the collar. The great advantage of this mode of constructing horse collars is this: a free circulation of air, vapor, &c., are allowed through the pores of the cloth, and consequently the liability of the horse's back being galled greatly lessened. Another advantage is that it avoids the necessity of a side seam. Viewing the collar as a whole it is more perfect in construction, has a neater appearance, and is less expensive than collars of the ordinary kind.]

26,749.—Lysander Button and Robert Blake, of Waterford, N. Y., for an Improved Hose Coupling:

We claim combining with the male and female parts, M and F, a closing pipe having an endwise motion through one of said parts, substantially as set forth.

26,750.—Nathan Chapman, of Mystic River, Conn., for an Improvement in Cotton and Hay Presses:

I claim a movable cotton press, constructed substantially as described, when operated by toggle links in combination with the pinion, J, and racks, I I, working or passing through the blocks, H H, arranged to work or traverse between ways, substantially as described.

In combination with the doors, T T, constructed as described, I claim the arms, Z Z, for closing and holding the doors closed, substantially as described.

26,751.—James M. Clark, of Philadelphia, Pa., for an Improvement in Flour Mills:

I claim, first, The arrangement of the center elevator, E, one trunk of which passes into the bolt chest, and when so arranged the combination of said elevator with the bolts, B and C, and conveyor, K, as set forth.

Second, I also claim one continuous bolt chest, L, containing two separate reels placed in a line, or end to end, in combination with the center elevator, E, as set forth.

26,752.—R. M. Curtice, of North Adams, Mich, for an Improvement in Cider Mills:

I claim the combination of the spheroidal cutter, C, and fluted cylinders, E E, arranged to operate substantially as and for the purpose set forth.

[This invention consists in combining with the ordinary fluted cylinders previously used for crushing apples, a spheroidal toothed cutter, or grater, placed within a suitable hopper, and so arranged to operate that the crushing of the apples in the process of manufacturing cider is greatly expedited. The invention also consists in using in connection with the fluted cylinders, clearers, so arranged as to free the interstices of the cylinders from the crushed apples, and thereby prevent the clogging of the cylinders, so that they may operate efficiently at all times. The invention further consists in an improved pressing device for expressing the juice from the crushed apples.]

26,753.—D. De Forest Douglass, of Springfield, Mass., for an Improvement in Artificial Legs:

I claim, first, The piece, e, applied in combination with the stop, c, to pass between the said stop and the front part of the thigh piece, substantially as and for the purpose set forth.

Second, The employment of a mortise and tenon ankle joint, g h h, constructed as described, in combination with a spring applied substantially as described, for controlling the action of the foot and toe.

26,754.—Augustus Eckert, of Dayton, Ohio, for an Improvement in Pulmonometers:

I claim the application of the buoy, E, to the bottom of the floating chamber, C, for the purposes and substantially as set forth.

[This invention is an improvement in lung gages consisting in furnishing the bottom of the inner or measuring cylinders with a close compartment, which surrounds the same, for the purpose of steadying said cylinder in its motion, and causing it to remain stationary at any point to which it has been blown up, so as to indicate with accuracy the vital capacity of the lungs.]

26,755.—Howell Evans, of Philadelphia, Pa., for an Improved Inkstand:

I claim the reservoir, B, with the cup-shaped mouth, a, constructed substantially as described, and so hung to any suitable standard, A, and arranged in respect to the screw or screws, h, or their equivalents, that by operating the said screw or screws, the reservoir will be so tilted on the stand as to cause the ink to flow either to or from the cup-shaped mouth, for the purpose specified.

26,756.—H. B. Fay, of New York City, for an Improvement in Stoves:

I claim the arrangement of the coal fire-chamber, B, within the body or case, A the flue, d, and the pipes, e f, communicating respectively with the smoke pipe, F, and the interior of the case, A, for the purpose specified.

[This invention consists in combining a wood and a coal-burning stove in such a manner that either kind of fuel (wood or coal) may be used as desired, and the stove made to diffuse equally as much heat with either fuel as those stoves that are constructed especially for each.]

26,757.—E. B. Furlong, of Charlestown, Mass., and Thomas Leavitt, of Malden, Mass., for an Improvement in Weighing Apparatuses:

We claim the arrangement of the weight, q, operating substantially as set forth, in combination with a weighing mechanism, for the purpose specified.

26,758.—Josiah W. Gill, of Exeter, N. H., for an Improved Rig for Reefing Fore and Aft Sails:

I claim the above described arrangement and application of the sail gaff and cross-trees, with respect to the mast and the main boom sail and gaff, and not only providing the extra sail with furling lines or devices, but the main gaff with appliances by which it may be made to operate with respect to the mast; all substantially as specified.

26,759.—Samuel H. Gilman, of New Orleans, La., for an Improvement in Furnaces for Burning Bagasse:

I claim the combination of an auxiliary fire-chamber for burning wood, coal, or other suitable dense fuel, with the bagasse fire-chamber, substantially as and for the purpose set forth.

And I also claim so combining the auxillary furnace and its ash-pit, with the bagasse furnace that both the fire-chamber and ash-pit of the auxiliary furnace shall communicate freely with the bagasse fire-chamber, substantially as and for the purpose specified.

26,760.—George Goewey, of Philadelphia, Pa., for an Improvement in Grain Fans:

I claim the employment of a sieve constructed as shown and described for the purpose of clearing grain.

26,761.—George P. Gordon, of New York City, for an Improved Printing Press:

I claim the combination of the rotating, reciprocating, inking roller frame, moving as described, upon a center, with the type or form bed, when such center and such bed shall always retain their relative positions towards each other; also the above combination in combination with the rotating ink-distributing table.

Second, I claim the combination of the rotating, reciprocating, inking roller frame, or equivalent, with the impression cylinder arms or their equivalents.

Third, I claim the rotating, reciprocating cylinder arms or their equivalents for holding and carrying the impression cylinder or its equivalent, in combination with the ways or bearers or their equivalent, for causing the impression cylinder or scraper or its equivalent to move evenly over the tympan and type in giving the impression.

Fourth, I claim combining with an elastic tympan a flexible metallic back or its equivalent, substantially as described for the purpose set forth.

Fifth, I claim the combination of a vibrating tympan with a vertical bed or a bed placed out of a horizontal position, when the impression shall be given by a cylindrical surface.

Sixth, I claim the combination of a vibrating tympan, constructed substantially as described, with the impression cylinder or its equivalent for the purpose specified.

Seventh, I claim giving to a vibrating tympan its periods of motion and rest, for the purposes specified, during the continued motion of the other parts of the press, substantially as set forth.

Eighth, I claim in combination with an impression produced by a cylindrical surface, the use of a rotating ink-distributing table.

26,762.—Samuel D. Hailey, of Jackson, Tenn., for an Improved Surveyor's Level:

I claim, first, Connecting the vertical tubes to the horizontal tube by means of a yielding joint, in any manner substantially as described.

Second, Combining a plumb and sights with the jointed tubes to keep them vertical, for the purposes set forth.

26,763.—Halvor Halvorson, of Cambridge, Mass., for Improvement in the Manufacture of Candles:

I claim the employment, in combination with the tubular wick, of the inner lining, b, of sized, starched or glazed paper, or other sufficiently impervious material, substantially as and for the purpose described.

26,764.—James T. Ham, of Sinatobia, Miss., for an Improvement in Cotton Presses:

I claim inclining the press as shown for the triple purpose of allowing the sweep that turns the windlass under the end of the press to cause the ropes or chains to wind uniformly on the windlass without over-riding or chafing, and to allow the former to run back by its own gravity and spread out the levers for the next operation, as set forth.

26,765.—Hatsell Higgins, of Orleans, Mass., for an Improved Anchor-tripper:

I claim the rotary anchor fluke tripper and its holder applied and used substantially as and for the purpose set forth.

26,766.—Edward Holmes and Britain Holmes, of Buffalo, N. Y., for an Improved Machine for Dressing Staves:

We claim the combination of the straight roller, I, with the convex roller, J, so as to allow the edge of the stave, as it passes into the cutters, to drop below the center or highest part of the convex roller (or bed over which the stave moves), substantially as set forth.

Second, We claim the combination and arrangement of the straight roller, I, and convex roller, J, with the tilting frame, C, (including the cutter) for the purposes and substantially as described.

26,767.—Thos. Houghton, of Philadelphia, Pa., for an Improvement in Lamps:

I claim the top of the ferrule, A, with its oval and inclined opening, in combination with the oval and inclined flange or projetion of the cap, B; the said flange and opening being formed and adapted to each other substantially as and for the purposes set forth.

26,768.—John A. Howland, of Providence, R. I., for an Improvement in Coal-sifters:

I claim the combination, with the sieve, D, of the center plate, f, center, g, boss, C, and shank, E, as and for the purpose shown and described.

[This invention consists in arranging in the interior of a barrel a center, which is supported by two or more arms that are attached to the inside of the barrel, and which center serves to support the sieve in such a manner that the latter can be rotated, and that it is guided by the center below and by the shank passing through a hole in the cover above.]

26,769.—Geo. W. Hubbard, of Meriden, Conn., for an Improved Molasses Gate:

I claim making the covering part adjustable, by means of the spring at each end, in the manner and for the purpose described.

26,770.—John W. Hudson, of Lafayette, Ind., for an Improvement in Seeding Machines:

I claim the teeth or share, D, provided with seed receptacles, h, fitted on the rods, a, as shown, provided with seed slides, o, and arranged to operate substantially as and for the purpose set forth.

[The object of this invention is to obtain a machine that may be used both as a roller and seeding machine; both functions being performed at the same time, or, by a simple adjustment, either performed separately. The invention also has for its object the varying of the working capacity of the device, as circumstances may require.]

26,771.—John Lane, of Lockport, Ill., for an Improvement in the Mole of Drain Plows:

I claim the combination, with the peculiarly-constructed mole, A A', of the shoulders, c c, which extend from the base of the mole slope backward as they rise, and terminate at a point about midway between the back of the stem or coulter and the rear end of the mole, substantially in the manner and for the purpose set forth.

[This invention consists in constructing the mole which forms the drain so that the front half of its length first forms what may be termed a minor arch-shaped drain, with compacted side walls; and the rear half of its length following after abruptly, instead of gradually, converts the minor drain into a major drain, or a drain of the proposed size. The mole, by being thus constructed, has an inclined wing or cutter formed on each side; and these wings, as the mole progresses through the ground, cut away the compacted earth which forms the side walls of the minor drain, and conduct the same in its compacted state to the top of the drain, and thus ensure a perfect pack of the drain at the top, and a filling up of the slit formed by the coulter stem with dirt which has already been, to a very great extent, rendered compact. This is certainly a very ingenious and valuable invention, as every one who is acquainted with this subject will readily perceive.]

26,772.—Robert Larter, Jr., of Newark, N. J., for an Improvement in Apparatus to feed Paper to Printing Presses:

I claim, first, Simultaneously moving inward a series of friction pieces from near the edge of the pile of paper, while a corresponding series of legs are pressed upon the pile at points nearer the center thereof, so as to cause the surface of one or more of the sheets at or near the top of the pile to rise in the space between the rubber and the legs; the upper one being raised more than the rest, and being thereby separated therefrom by a considerable stratum of air.

Second, I claim, in connection with hollow and vacuous legs, G', used in the manner substantially as shown, beveling the basis of the legs to correspond with the inclined position assumed by the upper sheet, C, under the action of the friction pieces, M.

Third, I claim controlling the apertures between the hollow legs, G', or their equivalents, and a vacuous space; and also operating all the friction pieces, M, or their equivalents, by a partial rotation of a trunk, H, arranged substantially as and so as to produce the effects set forth.

Fourth, I claim allowing for variation in the hight of the pile of the paper by providing slots, or equivalent "lost motion," in the connections, F F', or their equivalents, and determining the time of the rubbing action; and also the time of producing the vacuum in the legs, G', or their equivalents, by the contact of L, or an equivalent portion of the separating apparatus, with the pile of paper.

Fifth, I claim elevating the front edge of the sheet, after its separation from the pile, and pressing the same against a series of tapes, V, by a blast of air, arranged substantially in the manner shown, for the purpose of ensuring the forward motion of the sheet so soon as the vacuum in the legs, G', is destroyed. I also claim in combination therewith, effecting the complete separation of the upper sheet from the remainder of the pile by the deflection backward of a portion of the same air after its action on the front edge of the sheet, substantially as and for the purposes set forth.

Sixth, I claim securing a correct position of the front edge of the sheet by carrying it forward in advance of the time it is required to be delivered to the press, and by sliding forward the tapes, or equivalent supports, beneath it; while stops, Q Q, or their equivalents, are presented to its front edge, for the purpose of turning it into a correct position if askew.

Seventh, I claim giving a side motion to the sheet to secure a correct position of one of its edges, by a continuous movement of the rollers, X, or their equivalents, as set forth.

Eighth, I claim reversing the side movement of the sheet so as to register by either edge at pleasure, substantially in the manner shown.

26,773.—Walter G. Mackay, of New York City, for an Improvement in Ventilating Sinks, Water-closets, &c.:

I claim the application of the ventilating pipe, A, at the upper bend of a bent pipe trap, and at its junction with the soil pipe, B, in combination with said trap and soil pipe, in the manner and for the purposes specified.

26,774.—Eli Manross, of Bristol, Conn., for an Improved Latch for Gates:

I claim, as a new article of manufacture, the latch for doors and gates consisting of a movable catch retained in place by a spring, and acted upon by a slotted plate and projection, substantially in the manner and for the purpose described.

26,774.—E. J. McCarthy, of New York City, for an Improvement in Machinery for Burring Wool:

I claim the combination of the feed rollers with the stripping plate and the draw roller, arranged substantially as described for the purpose set forth.

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26,776.—Geo. A. Meacham, of New York City, for an Improvement in Buttons:

I claim, first, A button composed of the swelled or headed shank, A A′, and outer rim, B, so combined and arranged as to allow the rim to rotate and assume various angular positions, without twisting or straining the cloth, or fastening around the shank while being buttoned or unbuttoned, substantially as set forth and described.

Second, The teeth, a, arranged at the base of the shank, A, substantially as and for the purpose set forth.

26,777.—John Miner and Silas Merrick, of New Brighton, Pa., for an Improvement in Iron Railroad Cars:

We claim the employment of panel plates composed of a single piece of sheet metal struck up (whether such raised parts be ornamented or plain), and secured to the framework substantially in the manner and for the purposes described.

26,778.—Thomas Mitchell, of Lansingburgh, N. Y., for an Improved Machine for Boring Brush Blocks:

I claim, first, Attaching brush blocks, r, to the faces of a polygonal drum, E, having an intermittingly rotating movement, an intermittingly longitudinal sliding movement, and a reciprocating feed movement, in connection with rotary drills, p p (one or more) for the purpose of boring the blocks to receive the bristles.

Second, The arrangement of the racks, f g, on the cylinder, F, plate, H, bar, G, connected with the grooved bar, h, the stop bar, I, and slide, C C′, operated as shown, and having the shaft, D, of the drum and cylinder fitted in them with the weight, M, attached for giving the necessary movements to the polygonal drum, E, for the purpose set forth.

26,779.—James Montgomery, of Baltimore, Md., for an Improvement in the Construction of Steam Boilers.

I claim making vertical, or nearly vertical, water tubes for steam boilers or other purposes with their lower ends, to which the heat from the furnace is applied at its lowest temperature, thicker for any desired portion of their length than their upper ends to which the heat is applied at its greatestintensity,in the manner and for the purposes substantially as set forth.

26,780.—Campbell Morfit, of New York City, for an Improvement in Compositions for Coating Candles:

I claim the covering of tallow stearine or other candles with paraffine or paraffine mixtures, substantially as set forth, for the purpose of hardening their surface and improving their appearance and burning qualities.

26,781.—Joseph R. Palmenberg, of New York City, for an Improved Frame for Ladies' Dresses:

I claim the arrangement and construction of ladies' figures in parts, and the manner of fastening the separate parts together. substantially as described and for the purpose specified.

26,782.—Washburn Race, of Seneca Falls, N. Y., for an Improvement in Stove Registers:

I claim the application of the two damper plates, F F′, to the register plate, A, when geared together, so as to open upward simultaneously from the apertures, E E, situated at the bottom of the said register plate through the connection of the single clutch lever, G, with the expansive rod, C, in combination with said clutch lever and expansion rod, substantially in the manner and for the special purposes specified.

26,782.—Henry Rasquin, of New York City, for an Improvement in Skate-fastenings:

I claim, first, Providing the skating iron with two pins or wedges, substantially as described.

Second, Providing the boot or shoe with a groove, F, and with spring boxes, H and K, substantially as described and for the purpose set forth.

26,784.—Robert L. Reaney, of Philadelphia, Pa., for an Improvement in Gold Separators.

I claim the arrangement of the case, J, weight pan, K, shaft, I, rollers, H H′, central overflow tube, B, and exit pipe, L, as and for the purpose shown and described.

[This invention combines, in one machine, three distinct operations, viz.· grinding the gold quartz or other mineral with which gold is found associated, and reducing the same to a pulverulent state; washing and carrying off the light particles which are mechanically held in suspension, by a stream of water acting upon them in a peculiar manner and lastly, effecting, by means of grinders or crushers (which also act as agitators) and the action of the water upon the quartz, a more perfect amalgamation of the particles of gold than has yet been attained, and with great economy of time, labor and space. This invention will be understood by the above claim.]

26,785.—George W. Robertson, of Philadelphia, Pa., for an Improvement in the Waste-cocks of Hydrants:

I claim causing the "waste water" of a hydrant, pave-washer, or other similar hydraulic apparatus, to wash the joint produced at the junction of the plug with the upper part of the barrel of the waste-cock thereof, substantially in the manner and for the purpose set forth and described.

26,786.—F. W. Robinson, of Richmond, Ind., for an Improvement in Horse-powers:

I claim the peculiar arrangement of the pinions, c, bevel gears, C C, shafts, D D′, master wheel, B, pinions, E E′, shafts, e e′, gears, F F′, pinion, G, shaft, H, cross bars, J J′ K L, as and for the purpose shown and described.

26,787.—C. B. Rogers, of Norwich, Conn., for an Improved Machine for Cutting Moldings:

I claim, first, The use, of rotary cutter heads, K K, provided with necessary cutters, and placed obliquely with the stick, E, to be operated upon when said stick is fed between or underneath the cutters, K K, with a combined rotary and rectilinear movement for the purpose set forth.

Second, The combination of the feed rollers and cutter heads, arranged for joint operation as described.

[This invention consists in the use of feed rollers and cutter heads, arranged obliquely with the stick, in such a manner that the feed rollers will impart both a rotary and a longitudinal rectilineal movement to the stick; while the cutters will act on the stick in a plane obliquely with it, and cut the spiral bead or beads thereon.]

26,788.—Wm. Schaubel, of Philadelphia, Pa., for an Improvement in Steam Boilers:

I claim the arrangement of the casing, A, with its coiled flue, G, chimney, H, and the outer casing, B, and inner casing, C, and tubes, I I, of the fire-box.

26,789.—J. A. Sheffer, of Rochester, N. Y., for an Improvement in Coal-sifters:

I claim the combination and arrangement of the rockshaft, H R a a, and ways, W W, with the riddle, B, and containing-box, A, in the manner and for the purpose substantially as set forth.

26,790.—Abraham Shultz and Daniel Shultz, of Reading, Pa., for an Improved Washing Machine:

We claim the hexagonal rubber, E, with the spiral cleats, O O′, on the periphery, as set forth, in combination with the cross brace, B, and connecting rods, M M′, attached to one crank or eccentric for imparting a double concentric oscillating motion to the tub, A, and the hexagonal rubber, E, when constructed, arranged and combined as and for the purpose described and set forth.

26,791.—Franklin Skinner, of New Haven, Conn., for an Improved Machine for Cutting Shavings for Mattresses:

I claim the combination of the two wheels, B and D, or their equivalents, with their appendages, when the whole is constructed and made to produce the result substantially as described.

26,792.—R. L. Smith and C. Smith, of Stockport, N. Y., for an Improvement in Machines for Finishing Leather:

We claim, first, The combination of the polishing tool, L, with a horizontally moving stock, I, and bar, K, arranged and operating substantially as shown and described.

Second, The arrangement and combination of the vertical feed-regulating screw, G, lever, H, and bar, E, as and for the purpose set forth.

Third, The arrangement of the horizontal feeding nut, M, screw, N, and shaft, r, as and for the purpose shown and described.

Fourth, The combination with the crank, A, and rod, O, of the movable rack, P, pinion and shaft, p q, whereby the length of stroke of the polishing tool may be changed at pleasure.

[The object of this invention is to obtain a machine whereby the length of the stroke or vibration of the tool, as well as the pressure of the same on the leather, may be regulated with the greatest facility; the face of the tool is also kept parallel with the face of the bed over which the leather passes, and the latter fed by an automatic mechanism, evenly and with a regular movement to the tool.]

26,793.—Samuel M. Smith and Caleb Winegar, of Union Springs, N. Y., for an Improvement in Drain Tile Machines:

We claim the relative arrangement for united operation of the screening box, B, tile-making box, C, screening plunger, F, tile plunger, C, eccentrics, d e, for operating said plungers, F G, pulverizing chamber, A, and feeding shaft D, substantially as and for the purposes set forth.

[With this arrangement, the operations of pulverizing, screening and molding the clay into tiles are performed in one machine, by a continuing revolution of the driving shaft; the pulverization occurring first, the screening second, and the molding third. The pulverized clay empties into the screening box; from there it is forced through the screens into the molding box, and from these through the tile molds· the arrangement being such that, while the clay is being screened at one end of the machine, pulverized clay is coming into the screening box at the other end, and screened clay is being forced out through the tile molds. This is a simple and perfect arrangement.]

26,794.—John Souther, of Boston, Mass., for an Improvement in Apparatus for Evaporating Saccharine Juices:

I claim, first, a portable steam ladle for boiling hot sugar cane juice from one kettle to another, or the finished sugar to the coolers, as described.

Second, I claim the ladle constructed with a valve in the bottom, to receive the cane juice, or sugar, and a hollow handle or spout, through which the contents of the ladle is discharged, the outer end of said spout being suspended at a fixed hight, substantially in the manner and for the purpose described.

Third, I claim the combination of mechanism described, substantially in the manner and for the purpose set forth.

26,795.—Samuel Squire, of Brooklyn, N. Y., for an Improvement in Hydrostatic Balances:

I claim the diaphragm, B, adjustable index scale, E, fluid column, C, and levers shown in Figs. 4 and 5, the whole constructed and arranged substantially as described,

26,796.—J. K. Staman, of Miflin, Ohio, for an Improvement in Cultivators:

I claim, in combination with the bows, A and D, arranged relatively as specified, and having their lower ends chamfered as described, the cultivating teeth or shares, P, and the connecting brace strap, Q, when the whole is constructed and arranged as before set forth, for the purposes specified.

26,797.—G. A. Stanley, of Cleveland, Ohio, for an Improvement in Machinery for Molding Candles:

I claim the mold-box, or sliding frame, E E, in a stationary frame, A B, in combination with the tip-stands, H, at the base of the stationary frame, by means of which, in the descent of the molds, the candles are discharged therefrom, as specified.

Second, I claim drawing the wick into the mold by means of the jaws, O P, and retaining the wick in its proper position in the mold, as described.

Third, I claim the blades, X in combiuation with the plates upon the jaws, P, for the purpose of severing the wick after it has been secured between the jaws, O P.

Fourth, I claim the blade attached to the rack, M, for the purpose of cutting off the butt end of the candles, and separating the sprue tallow from the bottom of the sprue box.

Fifth, I claim the candle rack, Q Q′, and R R′, arranged and operating substantially as described, for the purpose of removing the candles, after they are discharged from the molds.

Sixth, I claim the described sprue box of adjustable parts—1st, to retain the tallow, 2d, to effect the removal of the sprue tallow, as set forth.

26,798.—Geo. A. Stanley, of Cleveland, Ohio, for an Improvement in Machinery for Molding Candles:

I claim the arrangement of the blades, E, upon the bar, D, for the purpose of cutting off the butts of the candles, and scraping the bottom of the sprue box.

Second, I claim forming the ends and sides of the sprue box of the rectangular frame, H F′ G G′, and removing the sprue tallow, by means of the movement of this frame, as specified.

26,799.—David Thain and Wm. Jackson, of Philadelphia, Pa., for an Improvement in obtaining Fatty Matters from Residues:

We claim obtaining the fatty acid, and other fatty matter remaining in the "acid bottoms" by distillation, in contact with superheated steam, substantially as described.

26,800.—R. B. Thompson, of Galesburg, Ill., for an Improvement in Tanning:

I claim the combination and use of the several ingredients compounded in proportion, as described, for the purpose of tanning leather from hides, as set forth.

26,801.—Lawriston Towne, of Providence, R. I., for an Improvement in making Chain from Sheet Metal:

I claim, first, Forming that portion of the carrier in which the blank link is transported in such a manner that it can be made to turn on an axis which shall be coincident with the axis of the blank link upon it, substantially as described.

Second, The combination of the supplemental plate, or its equivalent, with a stop, H, or its equivalent, for the purpose of determining the extent of rotation which shall be given to the plate, E, and thus insure the proper presentation of the blank to the chain, substantially as described for the purpose specified.

Third, I claim the mode of operation, substantially as specified, by means of which the punch, N, stop, E, and bending picks, d d d, or their equivalents, are made to co-operate in alternate positions in relation to the forming tube, for the purposes set forth.

26,802.—G. J Wardwell, of Barnston, Canada, for an Improvement in Stone-dressing Machines:

I claim the combination of a "stunner," and cutter together, or in the same instrument; the stunner preceding the cutter in its action both to "stun" the material for the cutter and to gage the depth of its cut, substantially as described.

I also claim the arrangement of the shafts, i and j, of the band pulleys, u s, upon frames, v p, distinct from and pivoted to the bed frames, x r, so that said shafts may be brought to a horizontal position (nearly or exactly), when the machine is working in an inclined position, in the manner and for the purposes specified.

I also claim the arrangement and combination of the lever, L, shipping frame, M, pulleys, G and p, shaft, E, pinion, I, feed finger, k, stay finger, b, and sword, h″, whereby the shipping frame and feed and stay fingers, are operated by one and the same movement of the shipping lever, substantially in the manner and for the purpose specified.

26,803.—A. A. Wilder, of Detroit, Mich., for an Improved Clapboard:

I claim the rounding or beveling the lower edge of clapboards, siding, or ceiling, for the purposes set forth.

26,804.—W. F. M. Williams, of Augusta, Ga., for an Improvement in Bridle Bits:

I claim a bridle bit, constructed in any manner substantially as set forth and shown.

Second, I claim combining sliding levers with two bars in the mouth, and adopting this construction to any bit now known, substantially as and for the purposes set forth.

Third, I claim the combination of an elastic and leather strap, connected as shown, with the circular sliding lever, and the bar in the mouth, in the manner set forth and shown.

26,805.—M. P. Wilmarth, of Pawtucket, R. I., for an Improvement in Ring Spinning Frames:

I claim the construction of the ring with the upwardly projecting rim, a, substantially as described for the purpose set ferth.

26,806.—O. D. Woodruff, of Southington, Conn., for an Improved Meat-cutter:

I claim the employment and arrangement of the revolving plate, K, within the case, A A′, with reference to the fingers, c, and cutters, a, operating substantially in the manner and for the purpose described.

26,807.—Edward Bagot (assignor to G. B. Gordon), of New York City, for an Improved Beer Measure:

I claim the combination of the two pipes, B C, applied to the beer measure, as and for the purposes set forth.

[The object of this invention is to obviate the difficulty attending the frothing of the beer as the latter is drawn from the barrel. This frothing of the beer, especially if it be new, causes a great deal of trouble and inconvenience in drawing beer by measurement for retailing, as considerable time elapses before the froth subsides. This invention consists in admitting the beer into the lower part of the measure and also pouring the beer from the lower part, by which arrangement the froth is prevented from forming in large quantities, and the froth that does form allowed to rise above the inner end of the discharge spout so that it may subside without being discharged from the measure.]

26,808.—Francis D. Ballou (assignor to himself and J. L. Nash), of Abington, Mass., for an Improvement in the Manufacture of Boots and Shoes:

I claim attaching, by sewing, the welt or strip of leather to the uppers of boots and shoes preparatory to lasting the same, thus enabling the work to be performed by sewing mechanism, substantially in the manner and for the purposes set forth.

26,809.—Henry Belfield (assignor to himself and Justice Cox), of Philadelphia, Pa., for an Improved Latch for Sliding Doors:

I claim the handles, D D, jointed to the plates, C C, with the spring latch, G, or its equivalent, and the whole applied to a sliding door substantially as set forth, so that the force applied to either of the handles, for sliding the door open, may be the means of detaching the latch from the jamb, as specified.

26,810.—Theodor Blume (assignor to himself and W. W. Hamer & Co.), of Cincinnati, Ohio, for an Improved Machine for Facing Pulleys:

I claim the described arrangement of the grindstone, A, hinged frame, F, nut, G, post, H, spindles, K K′, and adjustable bearing, L, the whole being constructed and combined in manner substantially as and for the purpose set forth.

26,811.—Seth Boyden (assignor to himself and H. H. Jaques), of Newark, N. J., for an Improvement in Machinery for Forming Hat Bodies:

I claim the fur director or plate, E, curved or bent, substantially as shown and arranged in relation with the cone, B, and picker, D, to operate substantially as and for the purpose set forth.

[This invention relates to an improved mode of directing or guiding the fur to the cone, whereby trunks and all other comparatively complicated appliances hitherto used for the purpose are dispensed with, and exceedingly simple and efficient device substituted therefor.]

26,812.—Geo. Bradley (assignor to Jacob S. Rogers), of Paterson, N. J., for an Improvement in the Cop Spinning Frame:

I claim the combination of the grooved tube, C c, and collar, E E′, with the dead spindle and cop, A B, when the whole is operated substantially in the manner and for the purposes set forth.

26,813.—Wm. B. Card (assignor to himself and John Sheny), of Sag Harbor, N. Y., for an Improved Alarm for Drawers:

I claim the slide, I, arranged with the bar, H, and knob-arbor or spindle, J, levers, F F G, and stop bar, D, and used in connection with the alarm, C, substantially as and for the purpose set forth.

I further claim the slide bar, L, when arranged with the bar, H, of the slide, I, in connection with the projection, s, on the underside of the counter or table, M, as and for the purpose set forth.

26,814.—Orril R. Chaplin, of St. Johnsbury, Vt., assignor to himself and O. G. Hale, of Waterford, Vt., for an Improvement in Mowing Machines:

I claim making the cutter bar or holder, E, in sections hinged together, in manner and for the purpose substantially as specified.

And in combination with so making the cutter bar, I claim making the connection, F, of the tails of the cutters in sections hinged together and to a connecting rod, essentially as described.

I also claim making each tooth, l, situated at the junction or joint of each two sections of the cutter bar in two parts hinged together, constructed and applied respectively to the two sections, as and for the purpose specified.

I also claim combining with the cutter bar made in sections, connected as described, a stiffener, L, constructed and made to operate therewith substantially as described.

I also claim combining the lever, N, and the shaft, M, together and to the frames, A and D, substantially as specified, in order that, by means of simultaneous movements of the lever in backward and lateral directions, the cutter bar frame may be elevated and the stiffener impelled forward at one and the same time.

26,815.—Lewis S. Chichester (assignor to Henry G. Evans), of New York City, for an Improvement in Cotton Gins:

I claim, first, The employment or use of the flanched shaft, P, arranged relatively with the roller, E, guard plate, G, screen, H, and feed board, I, to operate substantially as and for the purpose set forth.

Second, The combining, in one piece, of the guard plate, G, screen,

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H, and feed board, I, substantially as shown, for the purpose specified.

Third, The corrugated roller, F, in combination with the auxiliary smooth roller, F, and roller, C, with or without the elastic surface, D, arranged or disposed so that the roller, F, may serve in the capacity of a stripper to the roller, E, or both as a stripper and draw roller, as described.

Fourth, The employment or use of the discharging rollers, Q R, applied to a roller cotton gin, and arranged to operate substantially as and for the purpose set forth.

Fifth, The employment or use of the guard plate, G, either vibratory or stationary, in combination with the rollers, E F and B, substantially as set forth.

22,816.—John Dick (assignor to himself and S. C. Hills), of New York City, for an Improvement in Sewing Machines:

I claim, first, The combination of a feeding dog attached to a lever working on a fixed axle, on which the feed wheel rotates, and a retaining dog carried by an arm rigidly secured to the said axle, substantially as described.

Second, The combination, with the lever which carries the feeding dog, of a crank, H, applied to slide across the end of a hollow shaft, G, a lever, I, applied within the said shaft, and connecting the said crank with a screw arranged transversely to the said shaft, and an index attached to the said screw, outside of a dial attached to the exterior of the said shaft; the whole applied and operating substantially as described for the purpose set forth.

26,817.—Henry C. Foote, of Fredericktown, Ohio, assignor to himself and C. Kilgore, of Chattanooga, Tenn., for an Improved Combined Watch-key and Calendar:

I claim the combined calender and shield as a new article of manufacture, the same consisting of a shield, circular plates and split ring, as described.

[This invention consists in combining with a shield an adjustable circular plate; on the latter is inscribed the days of the months and days of the week, and on the former the days of the month, the whole forming an almanac which may be adjusted so as to readily indicate the day of the week or month; it forms also an ornamental pendant which, if made of gold or other metal, may be hung on a watch chain or ribbon, by a split ring or other suitable fastening, which will serve to keep the dial plate in its place.]

25,818.—Franklin B. Hunt (assignor to R. D. Van Duersen and Ira B. Gibbs), of Cincinnati, Ohio, for an Improvement in Mills:

I claim, first, the reversible block, Q, secondary frame, M, and cylinder carrier, F G H, constructed and arranged for the use of different cylinders, substantially as described.

Second, In combination with the above arrangement of ports, I claim the feed plates, U, constructed and arranged to operate substantially as described.

26,819.—Joseph J. Knight, of Philadelphia, Pa., assignor to himself, Thomas Patterson and James Lyndell, of Bristol, Pa., for an Improvement in Corn Planters:

I claim the axle, C, with the sleeve, E, its ratchet wheels, f f, operating the levers, h, the clutch box, d e, operated by the lever, F, the latter being connected to a catch, y, for operating the ratchet wheel, p, and also connected to the lever, W, on the shaft, x, for operating the plow teeth, H, when the whole of the parts are combined for joint action, as and for the purpose set forth.

26,820.—Wm. P. Patton (assignor to himself and Wm. Moyer), of Harrisburgh, Pa., for an Improved Stopper for Preserve Cans:

I claim the peculiar combination and arrangement of the several parts, A B C D, or their equivalents, substantially in the manner and for the purpose set forth and described.

26,821.—William Smith (assignor to Smith, Park & Co.), of Pittsburgh, Pa., for an Improvement in Railroad Car Wheels.

I claim making railroad car wheels having cast iron rims, and hubs with a rim plate, either sinuous or otherwise, extending around and underneath the rim, the hub and rim being connected by wrought iron spokes, placed alternately at the outer and inner face or edge of the rim and hub, in the manner described for the purpose of distributing the bearing or pressure of the spokes, so as to make it equal on both edges of the rim and hub.

Second, Making the cast iron rim of railroad car wheels with a sinuous rim plate cast in one piece with the rim, and extending around the inner face of the rim, the rim plate being so shaped that both of its edges (following its windings) are of equal length to each other and also to the circumference of the outer face or tread of the wheel, for the purpose of securing an equal degree of contraction of the rim and rim plate, and at the same time strengthening and bracing the rim and supporting the strain of the wrought iron spokes.

Third, Also, the combination in railroad car wheels of a cast iron rim, having a waving or sinuous rim plate around its under or inner circumference, with a cast iron hub connected with the rim plate and rim by means of wrought iron spokes arranged alternately near the inner and outer face of the wheel, substantially in the manner described.

26,822.—L. A. Dole (assignor to himself and Albert R. Silver), of Salem, Ohio, for an Improved Tool for Cutting Round Tenons:

I claim, first, The arrangement of the flanged cylinder, A, face plate, D, radial rests, e e e, and cutter, f, in the peculiarly constructed adjusting ring, C g, substantially as and for the purpose set forth.

Second, The combination of the right hand screw thread, k, formed on the inner circumference of the flanged cylinder, A, the left hand screw thread, l, formed on the circumference of the gage shank and the set nut, F, substantially as and for the purposes set forth.

[This is a very neat and simple tool. The end of the piece of wood on which a round tenon is to be cut is inserted into a hollow tube which has at its front end several radial rests and a radial cutter. The tool is revolved, and the stick being fed forward on the rests, has a perfectly round tenon formed on it by the cutter, the length of the tenon being gaged by means of an adjustable stop at the rear end of the tube. Mr. Dole also obtained a patent, through the Scientific American Patent Agency, last week, on a simple and good washing machine. This washing machine produces, by one movement of the hands, a lateral squeezing action, and an up-an-down rubbing action on the clothes.]

DESIGNS.

S. W. Gibbs, of Albany, N. Y., assignor to North, Chase and North, of Philadelphia, for a Design for Stoves.

Theodore W. Lillagore (assignor to Savery & Co.), of Philadelphia, Pa., for a Design for Fire-dogs.

ADDITIONAL IMPROVEMENT.

Addison G. Brush, of Great Bend, Pa., for an Improvement in Operating Churns. Patented June 15, 1858:

I claim, in combination with the rotating tread wheel, A, the vertical pins, a, vibrating levers, b b, and connecting rods, d d, arranged and operating with the rockshaft which drives the churn-dashers, as specified.

Notes & Queries

E. P. J., of Vt.—To make a cheap telescope, procure from an optician a 35-inch object-glass (that is, a convex glass which produces a focus of the sun's rays at the distance of 35 inches), and a 1-inch eye-glass (that is, a convex glass producing a focus at 1 inch). Employ a tin plate-worker to make two tin tubes, one 30 inches long, and about 1¼ inch in diameter; the other, 10 or 12 inches long, and its diameter such that it will just slide comfortably inside the larger. The inside of these tubes should be first painted, or otherwise lined with a dull black. At the end of the larger tube an ingenious workman will have no difficulty in securing the object-glass, so that no more than an inch diameter of it shall be exposed, and at the end of the smaller tube the eye-glass must be fixed. When the open end of one tube is inserted in the open end of the other, so that the two glasses shall be about 37 inches apart, a telescope will be presented which will magnify the diameter of objects 36 times; or, in other words, will make heavenly objects appear 36 times nearer. We need scarcely add that, with this instrument, all objects will appear inverted; but, with regard to celestial objects, this is of no importance.

C. T. M., of S. C.—You say: "Seeing an answer to a correspondent that a gunpowder engine would not work, for the reason that it would explode too suddenly, induced me to try the experiment. I took a tin can, and fixed the mouth of a pistol in it, with a gas cock to shut off to reload; and found, by firing very small quantities of powder in at a time, I could get up considerable pressure without bursting the can. Could that be used as a boiler in place of steam? I do not want to go to the expense of a model if it will not work." An interesting experiment; but the great difficulty is to prevent the cylinder from becoming foul with powder smoke.

J. I., of Iowa.—A circular saw which has become "buckled" by overheating can be straightened by the usual mode of hammering, or by cutting into the softened part, or by pressing out the buckle by a method described on page 379, Vol. X. (old series), SCIENTIFIC AMERICAN. It requires great care and a proper anvil to straighten a buckled saw by hammering, but it is the best method. It would require too much of our space to give you recipes for making such a number of varnishes as you desire for furniture and carriages.

M. M., of Mo.—When air is raised in temperature in a close vessel to 350° Fah., it exerts a pressure of 10.69 lbs. on the square inch. When air is heated to 491° Fah., it is doubled in volume at the same pressure; or, if confined to its original volume, it exerts a pressure of 15 lbs. on the square inch. In compressing air, it gives out its latent heat according to the pressure to which it is subjected; but we have no table of experiments which give the accurate degrees of temperature according to the pressures.

I. K., of Pa.—A belt for polishing oak and hickory spokes is made by coating the belt with glue, then dusting it over the entire surface with very fine emery, and allowing it to dry. Give three separate coats in this manner. Some persons mix the emery with the glue, and put the whole on at once with a brush. Be sure and allow it to dry thoroughly before you use the belt.

T. C. H., of Cal.—We have read of Dr. Collyer's discoveries in paper-making from straw, &c., but we are not minutely acquainted with the process. So far as we have been able to learn, we have thought it was similar to some of the processes used for making paper from straw in the United States. No patent has been taken out by Collyer in this country, but he has secured it in England, where he resides.

D. L. W., of Ind.—You are right about perpetual motion being as easily obtained by a magnet placed in a close vessel containing aquafortis and iron as by any other mode. The magnet, however, will soon become an oxyd by the action of any free acid that may be in the bottle.

H. K., of ——.—The atmospheric hammer to which you refer could compress air in a cylinder by its falling action, but no benefit could be derived from such an application, because no work could be performed by the falling hammer but the compression of the air. A galvanic battery is made of alternate plates of zinc and copper, arranged in pairs in cells or tumblers containing dilute sulphuric acid. All the plates are connected together in a circle with a thick copper wire.

J. N. V. L., of Va.—We do not remember having received your new theory in regard to the aurora borealis; but if we had received it, we should probably not have published it. We value new theories much less than we do new facts. If you will make any observations on the aurora at its next appearance, and will send us an account of them, we shall be pleased to give them a place in our paper. A gentleman in our office offers to furnish us with one new theory of the aurora borealis per day throughout the year.

F. L. G., of Conn.—You ask whether the metals gold, silver, copper and iron grow or not. All the metals are simple substances, and the quantity of them on the earth does not vary (with the exception of the small amount which is added by the fall of meteoric stones), but portions of them are constantly being moved from one part of the earth to another. Iron situated near the top of a hill may be washed down by the water and deposited in new beds at a lower level. There are also animals so small as to be invisible to the naked eye, the bodies of which are covered with scales of iron, and they congregate in marshes in such inconceivable multitudes as to form beds of iron ore which will supply large furnaces for years. Beds of metal may grow, but the quantity of metal on the earth does not sensibly vary.

J. W. & N. G., of C. W.—You can cast your plow points as hard as steel on the surface by using iron molds. You must cool the surface of the metal suddenly, if you wish to make it hard.

R. E., of Miss.—Sufficient heat may be concentrated by a burning lens from the solar beam to heat as much air as will drive a small air engine, but the lens will require to be very large, and to be continuously shifted, in order to focus the rays. The apparatus would be impracticable for useful purposes.

T. D. W., of Ala.—India-rubber tubing is not used in conveying steam except on extraordinary occasions, such as for carrying steam to extinguish a fire. It may thus be used, as it can stand a temperature somewhat above 230° Fah. We do not know the pressure such tubing will stand when highly heated, but you can get it made to stand a pressure of 200 lbs. of water on the square inch.

R. W. H., of Conn.—We think such a pipe as you mention would be very useful in many cases. We suppose you are aware that steam hose is made strengthened with coiled wire inside, but this is neither metal pipe nor elastic.

W. H. S., of Ind.—There is no tool used for dressing millstones, known to us, called the "diamond pick." Millers have frequently much trouble in obtaining picks that will keep the edge well for dressing stones, and they generally attribute the failure to a want of skill in tempering. The great object should be the selection of good cast steel, as no skill in tempering can make a good tool out of a poor piece of metal. Your method of backing millstones will be acceptable for publication.

S. T. V., of N. Y.—By boiling hickory wood in oil it does not become "seasoned" according to the common meaning of the term; but it is rendered harder and is prevented from absorbing moisture. Unless great care is observed, however, to boil it for a very short period only, the fiber of the wood will be greatly injured. You can season your hickory quickly by submitting it to boiling in water for about 10 minutes, then allowing it to dry afterwards in a shed. Steaming would effect similar results, the heat to which it is submitted having the effect of coagulating the vegetable albumen in the sap.

Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Jan. 14, 1860:—

S. & J. H. B., of Mo., $35; G. McK., of Ill., $25; G. D., of Ohio, $25; B. J. L., of Mass., $50; J. M. K., of Vt., $25; J. A. S., of Wis. $35; J. W. C., of Maine, $30; D. G. F., of Wis., $30; R. P. B., of Miss., $35; I. W. K., of Cal., $15; T. H. B. & Co., of N. Y., $250; G. W., of Conn., $30; C. A., of Ill., $55; P. M., of Ill., $65; J. G. P., of Pa., $30; T. J. G., of Mass., $25; G. W. D., of N. Y., $20; I. E. P., of Conn., $25; G P., of N. Y., $25; O. H., of N. Y., $15; H. H., of Cal., $10; A. H. C., of Wis., $12; A. E. D., of Ill., $30; D. W. M. L., of Iowa, $30: F. D., of Conn., $25; A. H., of Ill., $20; J. L., of N. Y., $30; G. P. of N. Y., $30; W. B. & R. B., of N. Y., $20; J. P. H., of La., $35; W. C., of N. Y., $55; W. A. P., of Vt., $25; J. A., of La., $30; J. H. T, of N. Y., $50; C. & E., of Conn., $25; P. & H., of Cal., $35; C. E., of N. J., $30: H. H., of Cal., $27; F. & H., of N. Y., $35; C. H. D., of Mass., $30; T. S., of Conn., $30; J. E. P., of Conn., $55; C. M. S., of Conn., $25. G. W. D., Jr., of Va., $25; J. H. N., of N. Y., $30; C. & P., of Ind., $30; J. McC., of N J., $20; B. & F., of Pa., $30; H. B. F., of N. Y., $30; J. H., of R. I., $50; M. V. B. B., of N. Y., $30; E. H., of Cal., $45; J. R. E., of La., $95; R. W. J., of R. I. $25 W. G. M., of N. Y., $30; G. L., of N. Y., $30; J. F. C. R., of N. Y., $30; P. A. of N. Y., $25. T. D., of N. J., $25; J. B. T., of Ill., $25.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, Jan. 14, 1860:—

T. D., of N. J.; P. A., of N. Y.; J. B. T., of Ill.; S. R., of N. J.; N. C. S., of Conn. (2 cases); J. M. K., of Vt.; I. E. P., of Conn.; H. H., of Cal.; G. L., of N. Y.; G. W., of N. Y.; H. M., of N. J.; O. H., of N. Y.; J. P. L., of N. Y.; F D., of Conn.; T. J. G., of Mass.. J. N., of N. Y.; R. W. H., of Ga.. J. C., of N. Y.; W. A. P., of Vt.; T. R. D., of N. J.; R. W. J., of R. I.; C. & E., of Conn.; G. W. D., Jr., of Va.; C. M. S., of Conn.; J. H., of R. I. (2 cases); W. H. L., of N. Y.; A. H. C., of Wis.; G. P., of N. Y.

Literary Notices.

THE GRAND HAVEN WEEKLY CLARION, from its central position between Detroit, Milwaukie and Chicago, has become one of the best mediums of advertising in the West. Published by H. S. Clubb & Co., Grand Haven, Mich.

HOVEY'S MAGAZINE OF HORTICULTURE.—This pioneer journal enters upon its twenty-sixth annual volume with the publication of the January number. It is the record of horticultural progress in the United States, and has accomplished a most important service in the dissemination of a taste for rural art. It should be read by all who take the least interest in horticulture. Address Hovey & Co., Boston, Mass.

CASSELLS' ILLUSTRATED FAMILY BIBLE.—The publication of the cheapest illustrated bible in the world has been commenced by Cassells, Petter & Galpin, No. 37 Park-row, this city. The first number has been issued, price 15 cents, and embraces the first eighteen chapters of Genesis, and contains no less than 32 beautiful and large wood-cuts, illustrating as many different scriptural subjects. It is got up in large quarto form, and the chief events of scripture history, comprising scenes, personages, cities, monuments, mountains, &c., will be liberally illustrated in all the other numbers to be issued. This form of the sacred scriptures deserves encouragement. Some of the greatest divines of the present age—including the eminent Dr. Chalmers—have been advocates of beautiful and correct illustrations of sacred topics.

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[Extract from a letter from Robert Maurin, Esq.]

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MR. PORTER.—Dear Sir:—"On our sugar mill engines, and also to a large number of circular sawmills, a cheap and accurate governor is much needed. The feed of cane being irregular, and also of sawing, it is necessary to stand by the throttle valve of my engine continually."

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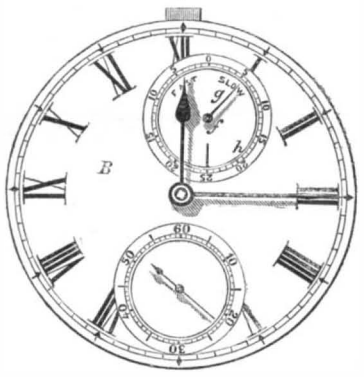
GORDON'S WATCH REGULATOR.

The part of a watch which regulates the speed of the movement is the balance wheel. It is arranged to swing with an oscillating motion, making part of a revolution in one direction, and then turning back in the other direction, being equivalent to a pendulum, which, from the discovery of Gallileo, has been found to be the most accurate of all mechanical measures of time. The balance wheel is connected with the escapement and with the gears in such manner that it is thrown around alternately in either direction at each release of the escapement; and it is prevented from turning entirely around by a delicate hair-spring, which is connected with its axle. The number of its oscillations in a given time depends principally upon the size of the balance wheel; but these may be varied slightly by altering the length of the hair-spring, or that portion of it which is

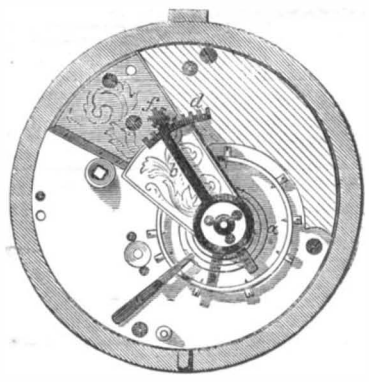
Fig. 1



in action. This is done by passing it, near the end which is fastened to the solid parts of the watch, between two stud pins placed in a position diagonal to its length, so that they bend it a trifle, and thus gripe it and prevent it from acting. These pins are set in a broad lever, called a "regulator," pivoted at one end so that, by turning the lever on its fulcrum, the pins are slipped along the hair-spring, and thus vary the length of the portion which is free to act upon the balance wheel.

The annexed cuts illustrate an improvement in the mode of moving the regulator, by which it may be done with remarkable accuracy and convenience. The end of

Fig. 2



the regulator, *d* (Fig. 2), is furnished with a rack, *b*, which gears into a delicate pinion, *f*, and the axis of this pinion passes through the parts to the front of the watch (Fig. 1), where it is mounted with the index, *g*, turning on a dial plate. It will be seen that, by turning the index, *g*, in either direction, the regulator, *d*, may be moved with very great delicacy; the gears being finer than those shown in the cut—indeed, too fine to be shown plainly in this style of print. After the watch is made and regulated, the index, *g*, is placed upon its axle, pointing at *o*; it is then turned half round the circle, and the number of seconds an hour which this varies the speed of the watch is noted; thus the distance through which it is necessary to move the index in order to vary the running of the watch one second an hour is ascertained, when the circle is divided accordingly. The index may be placed either on the dial plate of the watch or in a recess in the back of the inner case. This arrangement permits the regulating of the watch without opening it, and thus avoids the necessity of exposing its delicate mechanism to becoming foul with dust.

An application for a patent for this invention has been made (through the Scientific American Patent Agency) by John Gordon, of New London, Conn., who will be pleased to reply to all inquiries in relation to it which may be addressed to him at that place.

BRYANT'S IMPROVED JOURNAL-BOX.

The friction of axles in their bearings would rapidly wear them out were they not left very hard, and this leaves them so brittle that where there is great jar, as in the case of supporting railroad cars, they are very liable to break. This, besides the general desirableness of diminishing friction and saving of lubricating material, has led to many plans for interposing rollers between the axles of shafts and the journal-boxes, but these plans to the present time have been found objectionable in practice, and have not been used to any considerable extent. We here illustrate a new anti-friction journal-box, to which we can see, *a priori*, no objections, but whether any will develop themselves in practice can, of course, only be determined by trial. It is an important improvement, if upon testing it practically, it proves to answer the purpose.

The wheels or disks, B B, are rigidly secured to the axle, A, and the collar, C, also revolves with the axle. The rollers, *d d d d*, have their bearings in rings, *e e*, which are let into grooves in the insides of the disks, B B, into which grooves they fit loosely, so as not to be carried around in the rotations of the axle. The collar, C, has a semi-cylindrical elevation, *i i*, around its middle, and the rollers, *d d d d*, are grooved in the middle to prevent their pressing upon this elevation.

Fig. 2

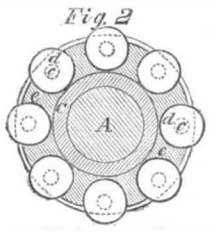


Fig. 3

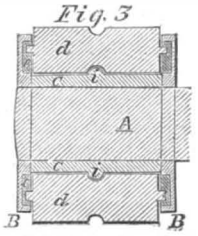
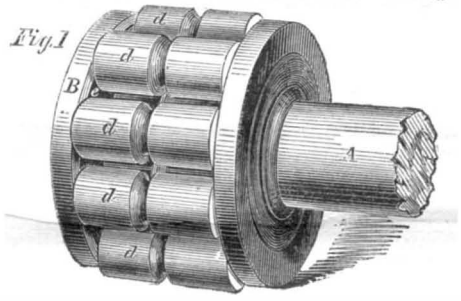


Fig. 1



It will be seen that by this arrangement the axle is absolutely relieved from *all* friction, as the rollers run upon the collar, C, which may be case-hardened or made of steel, permitting the axle to be reduced to such temper as will give it the greatest strength and toughness.

The smooth surface of the central base obviates a serious objection heretofore encountered by journal-boxes of this class—that is, the jarring motion and rattling noise. The crowding of the rollers against each other is also absolutely prevented by hanging them in the rings on axles.

The patent for this invention was ordered to be issued Dec. 17, 1859, and filed in the confidential archives of the Patent Office to enable the inventor to secure patents in foreign countries. Persons desiring further information in relation to it may address the inventor, J. Bryant, M. D., at No. 8 Clinton-street, Brooklyn, N. Y.

CAMELS *versus* MULES.—The introduction of camels into the southern States has been attended with great success. At a recent plowing match in Montgomery, Ala., the strength of the camel, compared with that of the mule, was tested. The result in this particular case was decidedly in favor of the camel; but whether or not it is more serviceable for plantation purposes can hardly be decided as yet.

LEMON PRESERVE.—An excellent substitute for jam may be made as follows:—One pound of powdered loaf sugar, a quarter of a pound of fresh butter, six eggs, leaving out the whites of two of them; adding the juice and rind of three fine lemons. Put the ingredients into a saucepan, and stir the whole gently over a slow fire until it becomes as thick as honey. Put it into small jars, and keep it in a cool, dry place.

MECHANICS

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IMPORTANT TO INVENTORS.—NEW ARRANGEMENT.

THE GREAT AMERICAN AND FOREIGN PATENT AGENCY.—Messrs. MUNN & CO., Proprietors of the SCIENTIFIC AMERICAN, are happy to announce the engagement of HON. JUDGE MASON, formerly Commissioner of Patents, as associate counsel with them in the prosecution of their extensive patent business. This connection renders their facilities still more ample than they have ever previously been for procuring Letters Patent, and attending to the various other departments of business pertaining to patents, such as Extensions, Appeals before the United States Court, Interferences, Opinions relative to Infringements, &c., &c. The long experience Messrs. MUNN & Co. have had in preparing Specifications and Drawings, extending over a period of fourteen years, has rendered them perfectly conversant with the mode of doing business at the United States Patent Office, and with the greater part of the inventions which have been patented. Information concerning the patentability of inventions is freely given, without charge, on sending a model or drawing and description to this office.

Consultation may be had with the firm, between NINE and FOUR o'clock, daily, at their PRINCIPAL OFFICE, No. 37 PARK ROW, NEW YORK. We have also established a BRANCH OFFICE in the CITY OF WASHINGTON, on the CORNER OF F AND SEVENTH-STREETS, opposite the United States Patent Office. This office is under the general superintendence of one of the firm, and is in daily communication with the Principal Office in New York, and personal attention will be given at the Patent Office to all such cases as may require it. Inventors and others who may visit Washington, having business at the Patent Office, are cordially invited to call at their office.

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Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

A pamphlet of information concerning the proper course to be pursued in obtaining Patents through their Agency, the requirements of the Patent Office, &c., may be had gratis upon application at the Principal Office or either of the Branches. They also furnish a Circular of information about Foreign Patents.

The annexed letters from the last two Commissioners of Patents we commend to the perusal of all persons interested in obtaining Patents:—

Messrs. MUNN & Co.:—I take pleasure in stating that while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE came through your hands. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours, very truly,

CHAS. MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial:—

Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements. Very respectfully,

Your obedient servant, J. HOLT.

Communications and remittances should be addressed to

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